Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning

A Reference for Local Governments within the South Coast Air Quality Management District

This Guidance Document is prepared by the South Coast Air Quality Management District (AQMD) as a reference for Cities and Counties within AQMD's jurisdiction. It provides suggested polices that local governments can use to prevent or reduce potential air pollution impacts and protect public health in their General Plans or through local planning. The objective of the Guidance Document is to facilitate stronger collaboration between local governments and the AQMD to reduce community exposure to source-specific and cumulative air pollution impacts.

November 9, 2004

Acknowledgements

The AQMD would like to acknowledge and thank the Western Riverside Council of Governments and the Orange County Council of Governments for their assistance in the preparation of the initial draft of the Model Air Quality Element. The AQMD staff would also like to extend gratitude for the ideas and suggestions received from the many stakeholders that participated in the development of this document.

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PREFACE

California state law requires each city and county to adopt a General Plan which expresses the community's development goals and embodies public policy relative to the distribution of future land uses, both public and private. General plans must address seven elements: land use, circulation, housing, conservation, open space, noise, and safety to the extent that provisions in these elements are relevant. Often, air quality concerns are addressed in these required elements, particularly land use and conservation. Cities and counties have the option to adopt additional elements to address other topics, such as air quality, which in the judgment of the legislative body relates to the physical development of the county or city. Once adopted, any optional element carries the same legal weight as any of the seven mandatory elements.

The South Coast Air Quality Management District's (AQMD) environmental justice program is designed to protect the rights of the residents in the South Coast Air Basin (Basin) to live and work in an environment of clean air, free of airborne health threats. The guiding principle of the program is based on "equitable environmental policymaking and enforcement to protect the health of all residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status, or geographic location, from the health effects of air pollution." The AQMD's environmental justice program was enhanced in 2002 to include the development of a model air quality element for cities and counties within AQMD's jurisdiction that considers the health risks to community residents associated with local government land use planning and decision-making. To that end, the AQMD is making this Guidance Document available to local governments as a tool to assist them as they develop or update their general plans.

State or federal law does not require separate air quality elements in General Plans and the AQMD holds no requirement that local governments include a "stand alone" air quality element in their plans. The AQMD encourages local governments to use the information presented in this guidance to: (1) help develop a separate air quality element, (2) update their current air quality element or (3) integrate air quality objectives, policies and strategies in other elements of their general plans. The full list of air pollution topics, as they are related to Land Use, Transportation/Circulation and Energy, in this Guidance Document is not intended to apply in every jurisdiction. We recognize that each community must address a unique combination of air quality and other community development issues in their general plans, therefore the format and scope of air pollution control strategies in this Guidance Document must be tailored to be consistent with the structure and content of their existing general plans. These topics are presented for Planners within local jurisdictions to consider and implement in a manner that can most effectively improve air quality and reduce the health impacts of air pollution in their communities. The appropriate mix of pertinent air quality strategies and control measures that effectively reduces air pollution and the level of detail of the related polices in the air quality element is solely at the discretion of the local

jurisdictions. The primary users will likely be local government planners within the district; however, the ideas, technical issues, and references in the Guidance Document are also intended for private developers, residents and community organizations. The document will be updated and revised periodically to make the most current information available as a user-friendly reference to help local governments update their general plans.

We encourage cities and counties in the district to utilize the Guidance Document as they update their general plans. The combined implementation of the suggested strategies throughout the region will strengthen the local government partnership with the AQMD to achieve state and federal clean air standards and demonstrate the resolve of cities and counties in the district to provide environmental equity and protect public health.

CHAPTER 1
INTRODUCTION

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INTRODUCTION

California state law requires each city and county to adopt a general plan "for the physical development of the county or city, and any land outside its boundaries which bears relation to its planning". The general plan must contain seven "elements": land use, circulation, housing, conservation, open-space, circulation, noise and safety. The policies in the required general plan elements are the basis for most land use decisions. Land use policies and practices have the potential to exacerbate localized air pollution impacts and adversely affect public health. State law offers the flexibility to go beyond the mandatory elements to adopt "any other elements or address any other subjects, which in the judgment of the legislative body, relate to the physical development of the county or city." Many cities and counties in the district have addressed air quality in other sections of the general plan, such as land use, circulation, conservation, and community design. While the air quality element is not mandatory, two counties (San Bernardino and Riverside) and 44 cities within AQMD's jurisdiction have adopted separate air quality elements in their general plans (Appendix A).

The Basin exceeds federal standards for ozone and particulate matter (PM_{10} and $PM_{2.5}$). It is currently the only area in the nation classified as "extreme" non attainment for ozone. The General Plan, as the foundation for all local planning and development, is an important tool to implement local government policies and programs that are vital to achieving clean air standards. The fact that Southern California continues to be faced with some of the most serious air pollution problems in the United States is a strong case for the topic of air quality to be included as a stand alone element in general plans. This chapter presents an overview of regulated air pollutants in the district and summarizes the effects of air pollution on public health and welfare.

REGULATED AIR POLLUTANTS

Air pollutants regulated by the federal and California Clean Air Acts or other laws fall under three categories:

- criteria air pollutants,
- toxic air contaminants (TAC),
- global warming and ozone-depleting gases.

Pollutants in each of these categories are monitored and regulated differently. Criteria air pollutants are measured by sampling concentrations in the air; toxic air contaminants are measured at the source and in the general atmosphere, and global warming and ozone-depleting gases are not monitored but are subject to federal and regional policies that call for their reduction and eventual phase out. The U.S. Environmental Protection Agency (EPA) has established ambient air quality standards for the following air pollutants:

- ozone (O_3)
- nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- sulfur dioxide (SO_2)
- lead (Pb)
- inhalable particulate matter (PM_{10})
- fine particulate matter ($PM_{2.5}$)

The California Air Resources Board (CARB) has also established ambient air quality standards for the six pollutants regulated by the EPA. Some of the California ambient air quality standards are more stringent than the national ambient air quality standards (NAAQS). In addition, California has established ambient air quality standards for the following pollutants or air quality conditions:

- hydrogen sulfide
- sulfates
- vinyl chloride
- visibility

NAAQS and California ambient air quality standards for the criteria pollutants are listed in Appendix B.

Criteria Air Pollutants

Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards, for outdoor or ambient concentrations to protect public health. The national and state ambient air quality standards have been set at levels to protect human health with an adequate margin of safety. For some pollutants, there are also secondary standards to protect the environment. The following is a description of the ambient air pollutants and the attainment status of each pollutant in the Basin. A discussion of the health effects of the criteria pollutants is found in Appendix C.

Carbon Monoxide. Carbon Monoxide (CO) is a colorless, odorless gas formed by the incomplete combustion of fuels. Motor vehicles are the main source of this gas. CO competes with oxygen, often replacing it in the blood, thus reducing the blood's ability to transport oxygen to vital organs in the body. The ambient air quality standard for carbon monoxide is intended to protect persons whose medical condition already compromises their circulatory system's ability to deliver oxygen. These medical conditions include certain heart ailments, chronic lung diseases, and anemia. Persons with these conditions have reduced exercise capacity even when exposed to relatively low levels of CO. Fetuses are at risk because their blood has an even greater affinity to bind with CO. Smokers are also at risk from ambient CO levels because smoking increases the background level of CO in their blood. The Basin is designated as a serious non-attainment area for carbon monoxide by both USEPA and CARB. However, there have been no violations of the CO standard in the past three years.

Nitrogen Dioxide. Nitrogen Dioxide (NO_2) is a byproduct of fuel combustion. The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts quickly to form NO_2, creating the mixture of NO and NO_2 commonly called NO_x. NO_2 acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in young children has also been observed at concentrations below 0.3 part per million (ppm). NO_2 absorbs blue light which results in a brownish red cast to the atmosphere and reduced visibility. Although NO_2 concentrations have not exceeded national standards since 1991 and the state hourly standard since 1993, NO_x emissions remain of concern because of their contribution to the formation of O_3 and particulate matter.

Ozone. Ozone (O_3) is one of a number of substances called photochemical oxidants that are formed when volatile organic compounds (VOC) and NO_x react in the presence of ultraviolet sunlight. O_3 concentrations are higher in the Basin than anywhere else in the nation, and the damaging effects of photochemical smog, which is a popular name for a number of oxidants in combination, are generally related to the concentrations of O_3. Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the subgroups most susceptible to O_3 effects. Short-term exposures (lasting for a few hours) to O_3 at levels typically observed in southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient O_3 levels and increases in daily hospital admission rates, as well as mortality, has also been reported. Although O_3 concentrations declined between 1991 and 1996 to the lowest levels since monitoring began, the Basin continues to have peak O_3 levels that are more than two times higher than the national standard and nearly three times higher than the more stringent state standard. The Basin is designated by both the EPA and the CARB as an extreme ozone non-attainment area.

In 1997, the EPA issued a new ozone air quality standard based on an 8-hour average exposure (the current federal ozone air quality standard is based on a 1-hour average period). The new 8-hour average ozone air quality standard provides for greater health protection. Under Presidential Orders, new emission controls to meet the 8-hour ozone standard will not be required until the region attains the current 1-hour ozone standard. Thus, current regulatory control continues to focus on attaining the 1-hour ozone standard with the recognition that these controls will have benefits toward attaining the 8-hour ozone standard.

Particulate Matter. Small inhalable particulate matter (PM_{10}) consists of extremely small suspended particles or droplets 10 microns or smaller in diameter that can lodge in the lungs, contributing to respiratory problems. PM_{10} arises from such sources as road dust, diesel soot, combustion products, tire and brake abrasion, construction

operations, and fires. It is also formed in the atmosphere from NO_x and SO_2 reactions with ammonia. PM_{10} scatters light and significantly reduces visibility.

Inhalable particulates pose a serious health hazard, alone or in combination with other pollutants. More than half of the smallest particles inhaled will be deposited in the lungs and can cause permanent lung damage. Inhalable particulates can also have a damaging effect on health by interfering with the body's mechanism for clearing the respiratory tract or by acting as a carrier of an absorbed toxic substance. For PM_{10}, EPA designates the Basin as serious non-attainment while CARB designates the Basin as simply non-attainment.

In 1997, the EPA established a new fine particulate matter $PM_{2.5}$ standard, in addition to the PM_{10} standard. $PM_{2.5}$ is defined as particulate matter with a diameter less than 2.5 microns and is a subset of PM_{10}. $PM_{2.5}$ consists mostly of products from the reaction of NO_x and SO_2 with ammonia, secondary organics, finer dust particles, and the combustion of fuels including diesel soot. Deadlines for meeting this standard will be ten years after the region is designated as non-attainment by the EPA.

Sulfur Dioxide. Sulfur dioxide (SO_2) is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. Health effects include acute respiratory symptoms and difficulty in breathing for children. Individuals with asthma may experience constriction of airways with exposure to SO_2. Though SO_2 concentrations have been reduced to levels well below state and federal standards, further reductions in SO_2 emissions are needed because SO_2 is a precursor to sulfate and PM_{10}. The Basin is considered a SO_2 attainment area by EPA and CARB.

Lead. Lead (Pb) concentrations once exceeded the state and federal air quality standards by a wide margin, but have not exceeded state or federal air quality standards at any regular monitoring station since 1982. Though special monitoring sites immediately downwind of lead sources recorded very localized violations of the state standard in 1994, no violations were recorded at these stations in 1996. Consequently, the Basin is designated as an attainment area for lead by both the EPA and CARB.

Volatile Organic Compounds. It should be noted that there are no state or federal ambient air quality standards for VOCs because they are not classified as criteria pollutants. VOCs are regulated, however, because a reduction in VOC emissions reduces certain chemical reactions which contribute to the formation of ozone. VOCs are also transformed into organic aerosols in the atmosphere, contributing to higher PM_{10} and lower visibility levels.

Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations of VOC. Some hydrocarbon components classified as VOC emissions are hazardous air pollutants. Benzene, for example, is a hydrocarbon component of VOC emissions that is known to be a human carcinogen.

Criteria air pollutant concentrations are typically higher in the Basin than in any other area of the country because of the region's climate, geographical setting, and high concentrations of industry and motor vehicles. Although still high, pollutant concentrations have declined sharply throughout the 1990s. Air quality in 1996 was the best recorded since air pollution agencies began monitoring air pollution in this region in the 1940s prior to the creation of the AQMD. Table 1-1 lists the primary emission sources of the criteria pollutants and some of the harmful effects of the pollutants.

Table 1-1

Primary Sources and Effects of Criteria Pollutants

Pollutants	Source	Primary Health and Welfare Effects
Lead (Pb)	Contaminated soil	Impairment of blood function and nerve construction Behavioral and hearing problems in children
Sulfur Dioxide (SO_2)	Combustion of sulfur-containing fossil fuels Smelting of sulfur-bearing metal ores Industrial processes	Aggravation of respiratory diseases (asthma, emphysema) Reduced lung function
Carbon Monoxide (CO)	Incomplete combustion of fuels and other carbon-containing substances, such as motor vehicle exhaust Natural events, such as decomposition of organic matter	Aggravation of some heart diseases (angina) Reduced tolerance for exercise Impairment of mental function Impairment of fetal development Death at high levels of exposure
Nitrogen Dioxide (NO_2)	Motor vehicle exhaust High-temperature stationary combustion Atmospheric reactions	Aggravation of respiratory illness
Ozone (O_3)	Atmospheric reaction of organic gases with nitrogen oxides in sunlight	Aggravation of respiratory and cardiovascular diseases Reduced lung function
Fine Particulate Matter ($PM_{2.5}$)	Stationary combustion of solid fuels Construction activities Industrial processes Atmospheric chemical reactions	Increased cough and chest discomfort Reduced lung function Aggravation of respiratory & cardio-respiratory diseases Increases in mortality rate Reduced lung function growth in children

Toxic Air Contaminants

Toxic air contaminants (TAC) are often referred to as "non-criteria" air contaminants because ambient air quality standards have not been established for them. There are hundreds of TACs, and exposure to these pollutants can cause or contribute to cancer

or non-cancer health effects such as birth defects, genetic damage, and other adverse health effects. Effects may be chronic (i.e., of long duration) or acute (i.e., of short duration) on human health. Acute health effects are attributable to short term exposure to air toxics. These effects include nausea, skin irritation, respiratory illness, and, in extreme cases, death. Chronic health effects result from long-term exposure. The effect of major concern for this type of exposure is cancer, which may develop up to 30 years after exposure. The federal EPA regulates TACs through technology-based requirements which are implemented by state & local agencies. California regulates TACs through the air toxics program (H&SC §§ 39660 et seq.) and the Air Toxics "Hot Spots" Information and Assessment (H&SC §§ 44300 et seq.).

The CARB, working in conjunction with the Office of Environmental Health Hazard Assessment (OEHHA), identifies TACs. Air toxic control measures (ATCMs) may then be adopted by CARB to reduce the identified TACs by a certain amount or below a specific threshold based on its potential effects on health. Air quality control agencies, including the AQMD, must implement ATCMs or adopt equal or more stringent control measures as rules within six months of adoption by CARB.

The Air Toxics "Hot Spots" Information and Assessment Act, codified in the Health and Safety Code, requires operators of specified facilities in the district to submit to the AQMD comprehensive emissions inventories and reports by specified dates. The AQMD reviews the reports and then places the facilities into high-, intermediate-, and low-priority categories, based on the potency, toxicity, quantity, and volume of emissions and on the proximity of receptors, including sensitive receptors to the facility. Facilities designated as high priority must prepare a health risk assessment. If the risk is above specified levels, facilities are required to notify the surrounding population and may be required to develop and implement a risk reduction plan.

The AQMD has also developed "industrywide" inventories and assessed risks of small business facilities with emissions that are easily characterized. Some of the facilities in the industrywide program are gas stations, small auto body shops, small dry cleaners, plating shops, and fiberglass product manufacturers. This information can then be used as an initial screening tool to determine whether a particular site is advisable for siting a sensitive receptor. In addition, additional information is available from the AQMD database on cumulative sources of toxic emissions and locations of toxic hot spots. Local governments may obtain this information by contacting the AQMD Air Toxics Program. Information is also available to determine if a facility is operating under AQMD permits and what types of pollutants are emitted.

The California Toxic Emissions Near Schools Program requires new or modified sources of air contaminants located within 1,000 feet of the outer boundary of an existing school to give public notice to the parents of school children before an AQMD Permit to Construct is granted (H&SC §§ 42301.6 and 42301.7). With respect to new school sitings, the AQMD identifies permitted facilities emitting TACs located within one-quarter of a mile of the proposed school site. AQMD has adopted many rules that are more stringent than federal or state requirements, especially for facilities emitting TACs

near schools. AQMD also adopts other rules that are not part of the federal or state programs and works with other agencies to encourage TAC reductions in their purview. The emissions inventory data are to be updated every four years. In addition to implementing federal and state toxic requirements, AQMD has an Air Toxics Control Plan and a Cumulative Impacts Reduction Strategy to further reduce TACs and their impacts on the communities in the Basin.

Global Warming And Ozone-Depleting Gases

"Stratospheric ozone depletion" refers to the slow destruction of naturally occurring ozone, which lies in the upper atmosphere (called the stratosphere) and which protects Earth from the damaging effects of solar ultraviolet radiation. Certain compounds, including chlorofluorocarbons (CFCs,) halons, carbon tetrachloride, methyl chloroform, and other halogenated compounds, accumulate in the lower atmosphere and then gradually migrate into the stratosphere. In the stratosphere, these compounds participate in complex chemical reactions to destroy the upper ozone layer. Destruction of the ozone layer increases the penetration of ultraviolet radiation to the Earth's surface, a known risk factor that can increase the incidence of skin cancers and cataracts, contribute to crop and fish damage, and further degrade air quality.

Some gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. This layer of gases in the atmosphere functions much the same as glass in a greenhouse (i.e., both prevent the escape of heat). This is why global warming is also known as the "greenhouse effect." Gases responsible for global warming and their relative contribution to the overall warming effect are carbon dioxide (55 percent), CFCs (24 percent), methane (15 percent), and nitrous oxide (6 percent). It is widely accepted that continued increases in greenhouse gases will contribute to global warming although there is uncertainty concerning the magnitude and timing of the warming trend.

Global warming gases and ozone-depleting gases include, but are not limited to, the following:

- **Carbon dioxide**. Carbon dioxide results from fossil fuel combustion in stationary and mobile sources. It contributes to the greenhouse effect, but not to stratospheric ozone depletion. In the Basin, approximately 48 percent of carbon dioxide emissions come from transportation, residential and utility sources contribute approximately 13 percent each, 20 percent come from industry, and the remainder come from a variety of other sources.

- **Chlorofluorocarbons**. CFCs are emitted from blowing agents used in producing foam insulation. They are also used in air conditioners and refrigerators and as solvents to clean electronic microcircuits. CFCs are primary contributors to stratospheric ozone depletion and to global warming. Sixty-three percent of CFC emissions in the Basin come from the industrial sector. Federal regulations require service practices that maximize recycling of ozone-depleting compounds (both CFCs, hydro-chlorofluorocarbons and their blends) during the

servicing and disposal of air-conditioning and refrigeration equipment. AQMD Rule 1415 – Reduction of Refrigerant Emissions from Stationary Refrigeration and Air Conditioning Systems requires CFC refrigerants to be reclaimed or recycled from stationary refrigeration and air conditioning systems. AQMD Rule 1405 – Control of Ethylene Oxide and Chlorofluorocarbon Emissions From Sterilization or Fumigant Processes requires recovery of reclamation of CFCs at certain commercial facilities and eliminates the use of some CFCs in sterilization processes. Some CFCs are classified as toxic air contaminants and regulated by AQMD Rule 1401 – New Source Review of Toxic Air Contaminants and AQMD Rule 1402 Control of Toxic Air Contaminants from Existing Sources.

- **Halons.** These compounds are used in fire extinguishers and behave as both ozone-depleting and greenhouse gases. Halon production ended in the United States in 1993. AQMD Rule 1418 – Halon Emissions From Fire Extinguishing Equipment requires the recovery and recycling of halons used in fire extinguishing systems and prohibits the sale of halon in small fire extinguishers.

- **Hydro-chlorofluorocarbons.** HCFCs are solvents, similar in use and chemical composition to CFCs. The hydrogen component makes HCFCs more chemically reactive than CFCs, allowing them to break down more quickly in the atmosphere. These compounds deplete the stratospheric ozone layer, but to a much lesser extent than CFCs. HCFCs are regulated under the same AQMD rules as CFCs.

- **Methane.** Methane is emitted from biogenic sources, incomplete combustion in forest fires, landfills, and leaks in natural gas pipelines. It is a greenhouse gas and traps heat 40-70 times more effectively than carbon dioxide. In the Basin, more than 50 percent of human-induced methane emissions come from natural gas pipelines, while landfills contribute 24 percent. Methane emissions from landfills are reduced by AQMD Rule 1150.1 - Control of Gaseous Emissions from Active Landfills. Methane emissions from petroleum sources are reduced by a number of rules in AQMD Regulation XI that control fugitive emissions from petroleum production, refining and distribution.

- **1,1,1,-trichloroethane (TCA**). TCA (methyl chloroform) is a solvent and cleaning agent commonly used by manufacturers. It is less destructive on the environment than CFCs or HCFCs, but its continued use will contribute to global warming and ozone depletion. 1,1,1-trichloroethane (TCA) is a synthetic chemical that does not occur naturally in the environment. No TCA is supposed to be manufactured for domestic use in the United States after January 1, 2002 because it affects the ozone layer. TCA had many industrial and household uses, including use as a solvent to dissolve other substances, such as glues and paints; to remove oil or grease from manufactured metal parts; and as an ingredient of household products such as spot cleaners, glues, and aerosol sprays. AQMD regulates this compound as a toxic air contaminant under Rules 1401 and 1402.

The Montreal Protocol on Substances That Deplete the Ozone Layer controls the phase-out of ozone depleting compounds (ODS). Under this international agreement, several organizations report on the science of ozone depletion, implement projects to help move away from ODS, and provide a forum for policy discussions. The AQMD supports state, federal and international policies to reduce levels of ozone depleting gases through its Global Warming Policy and rules. Further, AQMD has developed ODC Replacement Guidelines to facilitate transition from ODCs to substances that are the most environmentally benign.

EFFECTS OF AIR POLLUTION ON HEALTH AND WELFARE

The residents of southern California incur the cost of air pollution by:

- increased episodes of respiratory infections and other illnesses
- increased number of days of discomfort and missed days from work and school
- increased symptoms related to respiratory disease, including asthma
- slowed lung function growth and increased asthma risk in children
- shortened life spans
- reduced visibility

Polluted air also damages agriculture, the natural environment, and human-made materials. Improving air quality enhances public health and produces economic benefits that more than offset the costs of attaining clean air. The overall strategy for reducing air pollution for criteria pollutants in the district is contained in the Air Quality Management Plan (AQMP). The AQMP provides control measures that reduce emissions to attain both state and federal ambient air quality standards by their applicable deadlines. The cost benefit analysis for the plan was conducted as part of the 2003 AQMP development. However, not all the health benefits associated with implementing the AQMP can be quantified. Furthermore, the Air Toxic Control Plan amended in 2003 outlines the strategies pursued by the AQMD, CARB, and U. S. EPA to reduce air toxic emissions.

THE ROLE OF FEDERAL, STATE, AND LOCAL AGENCIES TO REDUCE AIR POLLUTION

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is responsible for establishing the national ambient air quality standards and enforcing the federal Clean Air Act. This agency also regulates emission sources under the exclusive authority of the federal government, such as aircraft, certain types of ships and locomotives. The EPA has jurisdiction over emission sources outside state waters (e.g., beyond the outer

continental shelf) and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must also meet the often stricter emission standards established by the California Air Resources Board (CARB). For additional information about the EPA, contact the EPA's general internet address at www.epa.gov. Information on the programs and activities in EPA Region IX, which includes California, can be found at www.epa.gov/region9, and additional information on Office of Mobile Sources can be found at www.epa.gov/omswww/omshome.htm.

California Air Resources Board

The CARB became part of the California Environmental Protection Agency (CalEPA) in 1991. The agency is responsible for ensuring implementation of the California Clean Air Act, meeting state requirements of the federal Clean Air Act, and establishing state ambient air quality standards. It is also responsible for setting vehicle emission standards and fuel specifications, and regulating emissions from other sources such as consumer products and certain types of mobile equipment (e.g., lawn & garden equipment, industrial forklift). The internet address for CalEPA is www.calepa.cahwet.gov; the address for CARB is www.arb.ca.gov.

South Coast Air Quality Management District

Because Southern California has one of the worst air quality problems in the nation, the AQMD was created by the 1977 Lewis Air Quality Management Act, which merged four county air pollution control agencies into one regional district to better address the issue of improving air quality in Southern California. Under the act, renamed the Lewis-Presley Air Quality Management Act in 1988, the AQMD is the agency principally responsible for comprehensive air pollution control in the South Coast Air Basin. Specifically, the AQMD is responsible for monitoring air quality and planning, implementing, and enforcing programs designed to attain and maintain state and federal ambient air quality standards in the district. Programs developed include air quality rules and regulations that regulate stationary source emissions, including area and point sources and certain mobile source emissions. The AQMD is also responsible for establishing permitting requirements for stationary sources and ensuring that new, modified, or relocated stationary sources do not create net emissions increases and, therefore, are consistent with the region's air quality goals. The AQMD enforces air quality rules and regulations through a variety of means, including inspections, educational or training programs, or fines, when necessary.

The AQMD has jurisdiction over an area of 10,743 square miles, referred to in this document as the district. This area includes all of Orange County, all of Los Angeles County except for the Antelope Valley, the non-desert portion of western San Bernardino County, and the western and Coachella Valley portions of Riverside County. The South Coast Air Basin (Basin) is a sub-region of the district and covers an area of 6,745 square miles. The Basin includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties. Figure 1-1 shows the jurisdictional boundaries of the district and the Basin.

Both the district and the Basin are surrounded by mountains, which tend to restrict air flow and concentrate pollutants in the valleys or "basins" below. The Basin is almost entirely urban, and its pollution is typically related to dense population and associated area sources, heavy vehicular traffic, and industrial sources. In the Coachella Valley, pollution problems are associated primarily with ozone transport from the Basin and with particulate emissions from heavy construction, travel on paved and unpaved roads, and agriculture.

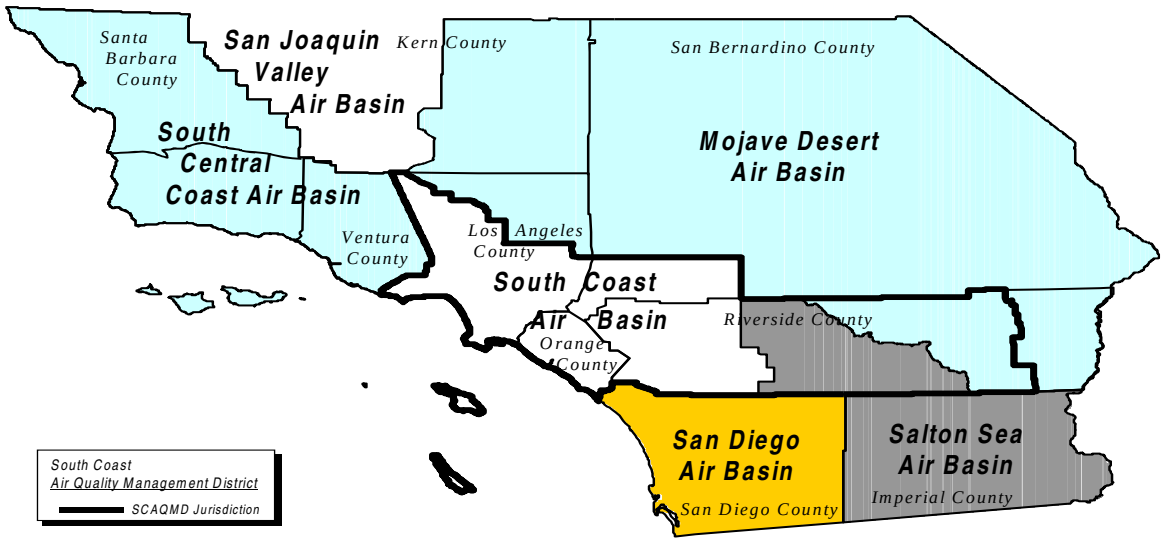

Figure 1-1

South Coast Air Quality Management District

The AQMD is organized according to procedures established by the California Legislature and specified in the Lewis-Presley Air Quality Management Act. The AQMD is organized into three branches. The first branch is the 12-member Governing Board, which is the decision-making body of the AQMD that adopts rules, regulations, and plans, such as the air quality management plan (AQMP). The Governing Board is comprised of nine elected officials, one county supervisor from each of the four counties in the district and five members representing the cities of each county. Because of its size, Los Angeles County has both an eastern and western cities representative. The three remaining board members are appointed to the board by state elected officials: one is appointed by the governor, another is appointed by the Speaker of the Assembly, and the third is appointed by the state Senate Rules Committee. Several advisory committees review and recommend actions to the Governing Board. For example, the Local Government and Small Business Assistance Advisory Group is made up of local government officials, small business representatives, and members of the general

public. This committee, therefore, offers local governmental agencies the opportunity to comment on the AQMD's rule-making and planning processes.

The second branch of the AQMD is the hearing board, which is a quasi-judicial panel authorized to provide relief to regulated facilities from AQMD regulations. Relief from regulations can only occur under specific circumstances, such as emergencies, etc. State law requires that the hearing board be appointed by the Governing Board, but the hearing board acts independently of the Governing Board. The third branch is management/staff, which is the bulk of the agency and reports to the AQMD Governing Board. This branch includes the divisions responsible for: developing rules and rule amendments; permitting of air pollution sources and rule compliance; planning programs such as the AQMP; air quality monitoring; public outreach and small business assistance; and prosecuting cases of rule violations. Additional information on the AQMD is available at AQMD's internet address - www.aqmd.gov.

Local Governments

Air quality issues in the district are addressed through the efforts of federal, state, regional, and local government agencies. These agencies and the legislation that authorizes them to regulate air quality are shown in Figure 1-2. Local governments work in concert with their Councils of Governments and the AQMD to improve air quality through a variety of programs, including regulatory actions, policy making, and education programs. Local governments have the flexibility to address air quality issues through ordinances, local circulation systems, transportation services, and land use. No other level of government has that authority, including the AQMD. For many local governments in the district, the general plans consolidate air quality related goals, objectives and polices into an optional air quality element. The air quality element gives direction for sound decision making on air quality-related issues and provides a solid basis to inform citizens, as well as developers, on air quality policies to protect public health.

Local governments, which include both city and county agencies, have the ability to control or mitigate air pollution through their police powers and land use decision-making authority. Many cities in the district have adopted air quality elements into their general plans, coordinating these elements with the Air Quality Management Plan (AQMP) and the congestion management program requirements of state law. Local ordinances can also provide mechanisms for reducing air pollution. For example, local design standards such as requiring bicycle racks and bicycle paths may result in reducing motor vehicle trips. Further, through capital improvement programs, local governments can fund infrastructure that contributes to improved air quality, such as bus turnouts, energy-efficient street lights, and synchronized traffic signals. Local governments can also take administrative actions that reduce air pollution, such as creating a telecommunication program to enable local government employees to work at home.

Figure 1-2

Authorizing Legislation with Air Quality Components

Government	Legislation	Implementing Agencies
Federal 	Clean Air Act	Environmental Protection Agency
State 	California Clean Air Act (H&S §§ 39660 et seq.)	California EPA and Air Resources Board
	AB 1807, Air Toxics Contaminants Act	Office of Environmental and Health Hazard Assessments
Regional 	Assembly Bill 2588, Air Toxics "Hot Spots" Information and Assessment Act of 1987	South Coast Air Quality Management District
	Lewis-Presley Air Quality Management Act	South Coast Air Quality Management District
Local 	Local Ordinances and **Air Quality Elements** General Plans (H&S §§ 65303)	Public Agencies Including Local Governments and County Transportation Commissions

Assembly Bill 2766 authorizes a $4 motor vehicle fee surcharge at the time motor vehicles are registered to be used solely to fund projects and programs that reduce air pollution from motor vehicles, as well as to fund mobile-source related planning, monitoring, enforcement, and technical studies necessary to implement the California Clean Air Act. The AQMD returns 40 percent of the total AB 2766 revenue Subvention Funds to cities and counties within the district based on the prorated share of the jurisdiction's population. The Subvention Funds must be exclusively used to implement programs that reduce air pollution from motor vehicles. For many cities, the AB 2766 revenue provides a vital funding source to implement AQMP mobile source control measures and meet requirements of state and federal Clean Air Acts. Cities and counties should consider the total emissions reduction potential of an AB 2766 project along with the expected emission reduction rate. An AB 2766 Resource Guide is available as a framework for use of the funds to help local governments evaluate and select cost-effective projects that are eligible for funding. The Resource Guide describes typical projects that reduce vehicle emissions from the following categories:

- purchase of alternative-fueled vehicles
- abatement of vehicle emissions
- implement land use strategies to reduce vehicle emissions
- public transportation programs
- traffic management projects
- transportation demand programs
- market-based strategies
- promote bicycle use
- PM_{10} reduction strategies
- public education

THE REGIONAL AIR QUALITY MANAGEMENT PLAN

The AQMD is the lead agency in charge of, with input from the Southern California Association of Governments (SCAG) and CARB, developing the AQMP. The AQMD has authority to reduce emissions from stationary sources, some area sources, and certain indirect sources. The AQMP is a comprehensive plan that includes control strategies for stationary and area sources, as well as for on-road and off-road mobile sources. SCAG has the primary responsibility for providing future growth projections and the development and implementation of transportation control measures. CARB in coordination with the federal agencies provides the control element for mobile sources.

ENVIRONMENTAL JUSTICE

The AQMD defines environmental justice as "equitable environmental policymaking and enforcement to protect the health of all residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status, or geographic location, from the health effects of air pollution." In 1997, AQMD implemented 10 environmental justice initiatives designed to protect district residents' right to live and work in an environment of clean air, free of airborne health threats. AQMD's environmental justice program expanded in 2002 to include 23 enhancements that serve as the basis for further outreach and problem-solving activities regarding environmental justice issues. The model air quality element for local governments as recommended in this Guidance Document is one program enhancements to further reduce health risks associated with air pollution. Annually, AQMD reviews the implementation of previous year EJ programs and establishes a new workplan for the following year.

REPORT FORMAT

The severity of local air pollution problems (e.g., wind blown dust in Coachella Valley) may affect the number and scope of air pollution related policies that jurisdictions adopt in their air quality elements. This Guidance Document is formatted according to topics

that are typically addressed in an air quality element. With each element, the interaction between air quality issues and the element is described and a potential menu of options to integrate air quality issues into the general plan is discussed. The topics included in this document are as follows:

Chapter 2 - Land Use
Chapter 3 - Transportation
Chapter 4 - Stationary Sources of Pollution
Chapter 5 - Reduction of Particulate Matter Emissions
Chapter 6 - Energy Conservation
Chapter 7 - Public Awareness and Education

CHAPTER 2

AIR QUALITY ISSUES REGARDING LAND USE

- **LAND USES, DENSITIES, SITE PLAN AND BUILDING DESIGN CONSIDERATIONS IN THE AIR QUALITY ELEMENT**

- **TRANSPORTATION INFRASTRUCTURE IMPACTS AND CONGESTION MANAGEMENT PROGRAM CONSIDERATIONS IN THE AIR QUALITY ELEMENT**

- **LOCAL GOVERNMENT SITING CRITERIA FOR SENSITIVE RECEPTORS**

- **SUGGESTED GOAL, OBJECTIVES AND POLICIES RELATED TO LAND USE**

AIR QUALITY ISSUE REGARDING LAND USE

Local government land use authority in planning, zoning, and permitting can be a very effective tool to minimize air pollutant emissions and health risk. Land-use related policies in the air quality element may identify areas appropriate for future uses and introduce design and distance parameters that reduce emissions and/or lower the health risk associated with those emissions. Local governments are encouraged to consolidate air-quality related policies in an air quality element that describe long-term, effective plans that consider cumulative air quality impacts and sensitive receptors in land use decisions.

LAND USES, DENSITIES, SITE PLAN AND BUILDING DESIGN CONSIDERATIONS IN THE AIR QUALITY ELEMENT OR LOCAL PLANNING

Land uses, densities, site plan design, and building design affect transportation requirements and associated mobile source emissions. According to the CARB document *Guidance for the Development of Indirect Source Control Programs*, design strategies that are sensitive to air quality issues, such as incorporating mixed uses into a land use project, can reduce vehicle trips by as much as 50 percent. Another example of a design standard sensitive to air quality that could reduce vehicle trips up to 10 percent is a site plan that incorporates amenities such as bicycle racks and pedestrian paths. Also, design-related features that are useful for reducing air pollution include: high densities and compatible land uses along transit corridors; lighter building and paving material colors, proper building orientation, and landscaping to maximize passive solar heating and cooling benefits.

The following questions should be explored relative to the potential of a development project to adversely affect air quality:

- Does the site design of public right-of-way and pedestrian walkways encourage pedestrian traffic? If not, can site be modified to encourage pedestrian traffic?
- Is onsite traffic circulation designed to reduce vehicle queuing? If not, can the project layout be modified to minimize vehicle idling emissions?
- Are links between the project and bike/pedestrian pathways adequate to facilitate walking and bicycling rather than driving? If not, can the site be modified to accommodate bike/pedestrian pathways?
- Do residential-specific plans incorporate mixed uses such as banks, post offices, etc., to minimize VMT but avoid incompatible land use between sensitive receptors and air pollution sources? If not, what are the impacts of mixed-use developments on sensitive receptors?

- Is the building or subdivision oriented to take advantage of natural heating and cooling patterns (e.g., solar)? If not, can the project be modified to be more energy efficient?
- Are landscaped treatments designed to reduce the energy needs of the building? If not, what landscaping options are available?
- Is the project accessible to transit facilities? If not, can the project design be modified to access public transit facilities?
- Do developments in transit corridors provide sustainable densities to support transit ridership? If not, how could those developments be modified to achieve minimum densities?
- Could the project affect the levels of service on the congestion management program (CMP) transportation system? If so, what would be the impact on the transportation system?

Local governments may provide suggestions to developers and proponents of facilities to improve air quality, such as:

- more energy-efficient appliances;
- landscaping to reduce electrical energy use (e.g., tree planting);
- use of solar energy;
- development standards such as lighter colored buildings and paving materials, providing bicycle racks at commercial developments, designating carpool parking spaces close to building entrances, and placing interior bus turnouts;
- low-emitting architectural coating materials; and
- other air pollution reduction measures (see www.aqmd.gov/ceqa/index.html).

TRANSPORTATION INFRASTRUCTURE IMPACTS AND CONGESTION MANAGEMENT PROGRAM CONSIDERATIONS IN THE AIR QUALITY ELEMENT

Land use development that affects local transportation/circulation systems by increasing traffic to congested roadways will reduce vehicle speeds and result in increased mobile source emissions that could adversely affect regional air quality, especially regional ozone levels and localized CO concentrations. Under the regional Congestion Management Plan (CMP), local governments are required to adopt and implement a program to analyze the impacts of land use decisions on their portion of the CMP transportation system. If the project would cause traffic service at an intersection to deteriorate below level of service E (considerable congestion) or the level established in the CMP, the resulting congestion should be addressed by improvements, programs, or actions that either mitigate the deficiency or measurably improve the level of service of the system. In fact, the CMP requires that the impact be mitigated through the development of a deficiency plan. AQMD staff are available to assist local agencies

with identifying local areas where a project or series of projects may bring increased congestion to a segment of roadway. It may also be useful for identifying measures that reduce traffic and improve circulation, thus contributing to improved air quality. Examples of such measures include traffic synchronization, and traffic calming techniques.

LOCAL GOVERNMENT SITING CRITERIA FOR SENSITIVE RECEPTORS

When considering land uses and population densities in their jurisdiction, local governments should be aware of land use compatibility issues, particularly in reference to sensitive receptors. A sensitive receptor is a person in the population who is particularly susceptible to health effects due to exposure to an air contaminant. Sensitive receptors (and the facilities that house them) in proximity to TACs are of particular concern. The following are land uses where sensitive receptors are typically located.

- schools, playgrounds and childcare centers
- long-term health care facilities
- rehabilitation centers
- convalescent centers
- hospitals
- retirement homes
- residences

Local governments can provide current information on air quality issues to project proponents through the use of handouts, land use/zoning maps and sensitive receptor maps distributed by their planning departments. Information on land use could be provided to proponents of development projects to address air quality concerns by describing (1) compatible land uses (e.g. higher densities in clean transit corridors and support services in commercial districts), and (2) incompatible land uses (e.g. sensitive receptors adjacent to co-located sources of TACs). Table 2-1 lists examples of source categories that have the potential to result in significant health risks from an air pollution perspective if located near sensitive individuals.

Table 2-1

Examples of Siting Scenarios That Should Trigger a Thorough Analysis of Air Quality Impacts

Source Category	Size or Control Parameters	Distance to or from Sensitive Receptor
Rail Yards	Major	1 mile (1600 meters) or closer
Intermodal Facilities	Major	
Ports	Major	
Roadways with Heavy Diesel Truck Traffic	Traffic volume of over 20,000 heavy-duty diesel trucks per day	1000 feet (300 meters) or closer
Truck Stop	More than 300 diesel trucks per day	
Cold Storage Distribution Center	More than 100 transport refrigeration unit - equipped diesel trucks per day	
Chrome Platers	Any hard or decorative chrome plating facility	500 feet (150 meters) or closer
Freeway or Busy Traffic Corridor	Traffic volume of over 100,000 vehicles per day in urban area, 50,000 per day in rural area	
Dry Cleaner	Using 100 gallons of perchloroethylene per year; includes all dry cleaners co-located with residences	300 feet (90 meters) or closer
Large Gasoline Stations	With over 2,500,000 gallons annual throughput and having Phase I and II controls	50 feet (15 meters) or closer

Source – DRAFT Air Quality and Land Use Handbook: A Community Health Perspective. CARB, May 2004

Facilities That Emit Odors or Dust

Both the AQMD and local governments receive complaints about dust and offensive odors. The sources of these complaints need to be identified from both the emitter and the downwind receptor. Preferably, this will be done while the project is still in its initial design phase. While almost any source may emit objectionable odors, some land uses will be more likely to produce odors or dust because of their operation. Table 2-2 shows the types of facilities or operations that are prone to generate odors and dust based on complaints received by the AQMD.

Assessing potential impacts depends on such variables as wind speed, wind direction, and the sensitivity of receptors. Special care needs to be given to the initial siting and design of these operations and facilities. Local governments should identify both new projects that have a probability of pollution-related complaints and new developments that may be affected by existing upwind sources. If potential odor and dust sources can be identified and mitigated before construction, then subsequent health impacts and enforcement problems may be avoided. Siting decisions should consider, where feasible, appropriate setbacks that would minimize potential impacts on sensitive receptors. Local governments are advised to contact the AQMD's Office of Engineering and Compliance to determine if complaints have been filed by property owners or occupants in the general vicinity of a proposed project site and thereby determine whether sensitive receptors could be affected by dust or odors.

Table 2-2

Sources of Odor and Dust Complaints Received from the AQMD

Sources of Odors	Sources of Dust
Agriculture (farming and livestock)	Agricultural (Land Tilling)
Chemical Plants	Asphalt and Cement Plants
Composting Operations	Auto Body Facilities
Dairies	Construction Activities
Fiberglass Molding	Diesel Engines/Vehicles
Landfills	Composting Operations
Refineries	Fertilizer Operations
Rendering Plants	Fiberglass Molding
Train Yards	Furniture Manufacturing - Sawdust
Wastewater Treatment Plant	Landfills and Transfer Stations
	Refineries
	Roofing Operations
	Rubber Manufacturing
	Sand and Gravel Operations
	Sandblasting
	Silk Screening
	Wood dust

Mobile Source Emissions

Recent results from the Children's Health Study have shown strong evidence of adverse effects in growing children exposed to ambient levels of traffic-related pollutants. This study followed children in 12 communities in Southern California from 4th grade through 12th grade (McConnell, K., et al, 2002). Children in communities with high levels of NOx, $PM_{2.5}$, acid vapors, and elemental carbon showed reduced lung function growth over the study period. Additionally, a higher level of asthma was found in the children that lived nearest to busy roadways. Other recent studies have found an increased incidence of adverse effects among those who live near busy roadways; these include increased respiratory disease and increased mortality (Wilhelm, M., et al 2003; Kim, J. 2003, et al 2004).

While most of the published studies were conducted in Europe, several studies in the U.S. are being conducted and are showing similar results. These studies found that residential proximity to traffic was associated with increased risk of low birth weight, increased medical visits for asthma and increased respiratory symptoms in children. Studies conducted near freeways in Southern California show that traffic emissions, such as carbon monoxide, ultra-fine particulates, and black carbon (soot) are several times higher next to freeways than the background concentrations. These concentrations fell to lower levels with increasing distance from the roadway,

decreasing about 60-80 percent within 100 meters (Zhu, Yifang, et al, 2002). Based on the results of AQMD's Multiple Air Toxics Exposure Study (MATES II), diesel exhaust is responsible for 70 percent of the cancer risk associated with air pollution in the basin. An example of the relationship of cancer risk from diesel particulate matter with respect to the proximity to the roadway is shown in Figure 2-1. Table 2-3 estimated cancer risk from diesel emissions in rural and urban areas.

The AQMD provides guidance for analyzing cancer risks from diesel particulate matter from mobile sources at facilities such as truck stops and warehouse distribution centers. The document is titled Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis. This guidance describes analysis of potential cancer risks associated with diesel particulates from truck idling and movement (such as truck stops, warehouse and distribution centers, or transit centers), ship hotelling at ports, and train idling. It is suggested that projects with diesel-powered mobile sources use this Guidance Document to quantify potential cancer risks from the diesel particulate emissions.

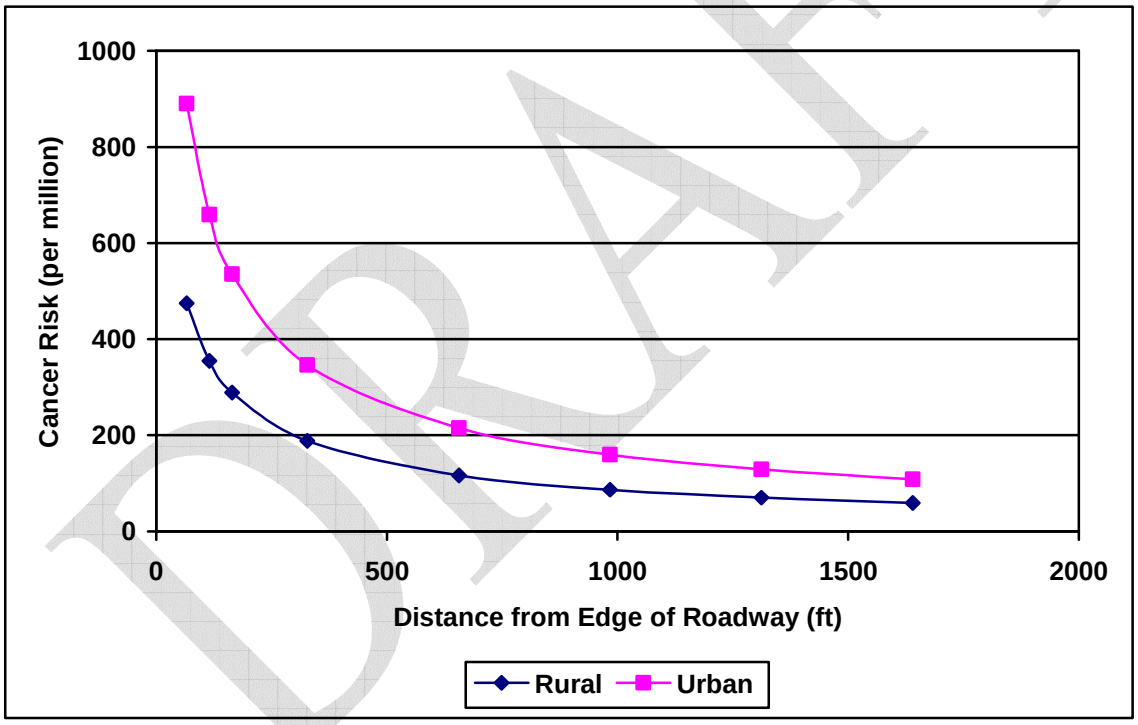

Figure 2-1

Cancer risk from diesel particulate matter as a function of downwind distance

Source: South Coast Air Quality Management District. Adapted from the California Air Resources Board's Diesel Risk Reduction Plan.

Table 2-3
Cancer Risks from Diesel Particulate Matter at the Edge of Roadways in Rural and Urban Areas

Distance from Edge of Roadway	Diesel Particulate Matter (DPM) Cancer Risk (in one million)		Total Cancer Risk (in one million)*	
	Rural	Urban	Rural*	Urban*
20 m	475	890	589	1104
500 ft	151	277	187	343
1000 ft	86	159	107	197

Source: South Coast Air Quality Management District. Adapted from the California Air Resources Board's Diesel Risk Reduction Plan.

* To account for gasoline vehicle emissions, the diesel PM risk was multiplied by 1.24. This represents the relative risk contribution from benzene, 1,3 butadiene, formaldehyde, and acetaldehyde on a basin-wide basis. It is assumed that the vast majority of benzene, 1,3 butadiene, formaldehyde, and acetaldehyde emissions come from on-road gasoline vehicles.

Facilities That Emit Toxic Air Contaminants

AQMD's Environmental Justice program called for a comprehensive air toxics monitoring study (Multiple Air Toxics Exposure Study or "MATES II). MATES-II included fixed sites characterizing neighborhood-scale conditions and a complementary microscale study to sample potential localized influences of toxic-emitting sources near residential neighborhoods. In addition to the monitoring, efforts were made to upgrade the TAC inventories, and this information was utilized with computer simulation models to depict toxic risks for the entire Basin. In total, the MATES-II project represents one of the most comprehensive air toxics monitoring programs ever conducted in a major urban area in the country, and is being recognized as a model program. Relevant findings from the study revealed the following:

- Cancer risk from ambient measurements in the basin was found to be 1400 in a million;
- Diesel exhaust is responsible for about **70 percent** of the total cancer risk from air pollution;
- Emissions from mobile sources -- including cars and trucks as well as ships, trains and planes -- account for about **90 percent** of the cancer risk. Emissions from businesses and industry are responsible for the remaining 10 percent; and
- The highest cancer risk occurs in south Los Angeles County -- including the port area -- and along major freeways.

The AQMD recently started another intensive one-year study to assess current levels of cancer-causing toxic air pollutants and the risk they pose to district residents. This study will help gauge the effectiveness of our current regulations and serve as a vital

tool in helping shape future air quality and environmental justice policies. MATES III will monitor for 21 TACs and four other substances at 10 sites across the Los Angeles Basin. The AQMD will use moveable monitoring stations to sample at neighborhood sites near toxic emission sources or in areas where community members are concerned about health risks from air pollution. Such neighborhood sites could be near airports, railroads, warehouses, landfills, high-volume vehicle traffic or multiple commercial or industrial facilities. Sampling at each neighborhood site lasts for up to two months. The goal of MATES III is to update TAC levels and toxic emission inventories, and then input those data into a computer model of air dispersion to determine the cancer, as well as non-cancer, health risk from air toxics across the district. The study also will investigate potential toxic "hot spots" in communities. The study is expected to be concluded in the summer of 2005.

TACs are of particular concern with regard to sensitive receptors. For example, state law requires school districts to consider the impact of siting a new school close to existing facilities that emit TACs. This same principle should be applied in siting other sensitive receptors close to facilities that emit TAC, such as retirement homes, schools, hospitals, or athletic facilities. AQMD serves as a clearinghouse for publicly available information on stationary sources that emit TAC and associated public health risks. This information is compiled from documentation required of facilities that emit TAC by AQMD Rule 1401, Rule 1402, and Assembly Bill (AB) 2588 Air Toxics Hot Spots Program (H&SC §§ 39660 et seq.). AQMD staff will help identify potential health risk. Additionally, it should be noted that toxic risk assessment is routinely included in the CEQA evaluation by the local government in its land use decision.

Examples of facilities with the potential to emit air TACs that could pose a health risk and the pollutants of concern are shown in Table 2-4. AQMD staff are available to assist the local governments in this effort by identifying sources of TACs within their jurisdictions. When locating sensitive receptors near any of these types of sources, or vise versa, local governments could contact the AQMD for analytical methods that can be used to assess the potential health risks for various siting scenarios.

Mapping Sources of Toxic Air Contaminants Sources

Local governments should utilize land use or zoning maps to identify the location of facilities that are potential sources of TACs. Land use/zoning maps are useful for identifying potential incompatible land uses (e.g., a chrome-plating shop next to a school). Bicycle pathways and transit bus stops where land dedications are required can also be identified on maps, along with transit corridors, which are important when considering density and land uses necessary to support high occupancy vehicle ridership. The AQMD staff is available to assist local jurisdictions in identifying known permitted stationary sources of TACs in their jurisdiction.

Table 2-4 – Examples of Facilities That May Emit Toxic Air Contaminants

Categories	Facility Type	Air Pollutants of Concern
Commercial		
	Dry Cleaners	Perchloroethylene
	Chrome Platers	Hexavalent Chromium
	Gas Stations	Benzene
	Auto Body Shops	Metals, Solvents
	Furniture Repair	Solvents[1], Methylene Chloride
	Film Processing Services	Solvents, Perchloroethylene
	Cold Storage Distribution Centers, Warehouses	Diesel Particulate Matter
	Printing Shops	Solvents
	Diesel Engines	Diesel Particulate Matter
Industrial		
	Manufacturers	Solvents, Metals
	Metal Platers, Welders, Metal Spray (flame spray) Operations	Hexavalent Chromium, Nickel, Metals
	Chemical Producers	Solvents, Metals
	Gasoline Refineries	Benzene, Solvents, Metals, PAHs, Dioxin
	Furniture Manufacturers	Solvents
	Shipbuilding and Repair	Hexavalent chromium and other metals, Solvents
	Hazardous Waste Incinerators	Dioxin, Solvents, Metals
	Power Plants	Benzene, Formaldehyde, Particulate Matter
	Research and Development Facilities	Solvents, Metals, etc.
	Freight Distribution Centers	Diesel Particulate Matter
Public		
	Landfills	Benzene, Vinyl Chloride, Diesel Particulate Matter
	Waste Water Treatment Plants	Hydrogen Sulfide
	Medical Waste Incinerators	Dioxin, Benzene, PAH, PCBs, 1,3-Butadiene
	Recycling, Garbage Transfer Stations	Diesel Particulate Matter
	Municipal Incinerators	Dioxin, Benzene, PAH, PCBs, 1,3-Butadiene
Transportation		
	Port Facilities	Diesel Particulate Matter, Methyl Bromide
	Airports	Benzene, Formaldehyde
	Rail Yards	Diesel Particulate Matter
	Intermodal Facilities	Diesel Particulate Matter
	Truck Stops	Diesel Particulate Matter
	Freeways and Roadways	Diesel Particulate Matter, Benzene, 1,3-Butadiene, Formaldehyde
Agricultural Operations		
	Farming Operations	Diesel Particulate Matter, VOCs, NOx, PM_{10}, CO, SOx, Pesticides
	Livestock and Dairy Operations	Ammonia, VOCs, PM_{10}

[1]Not all solvents are toxic air contaminants. Some solvent use may emit toxic air pollutants.

Source – DRAFT Air Quality and Land Use Handbook: A Community Health Perspective. CARB, May 2004

Siting issues, with respect to sensitive receptors need to be identified early in the review process, preferably before projects are formally submitted to the public agencies' planning boards. The following two air quality questions relate to land use compatibility and should be considered for each project with sensitive receptors:

- Will a sensitive receptor be located within one-quarter-mile of an existing facility that emits TACs?
- Will a sensitive receptor be located downwind from an existing source of odors?

The information in Table 2-4 may be used as a screening tool for local governments to determine if a more detailed analysis is needed. In extreme situations, local governments may consider changing the underlying zoning to eliminate future conflicts. One option available to cities is to require developers of new sensitive receptor facilities to provide an inventory of all major sources of air pollution within a specified radius of the proposed site. Site locations of major pollution sources and the pollutants they emit are available from the AQMD.

SUGGESTED GOAL, OBJECTIVES AND POLICIES RELATED TO LAND USE

Goal 1 **Address the relationship between land use and air quality to protect public health and minimize impacts on existing land use patterns and future land use development**

Objective 1.1 **Ensure that land use plans are implemented to adequately separate sources of air pollution from sensitive receptors such as schools and hospitals.**

Suggested Policies to Protect Sensitive Receptors from Exposure and Health Risks Related to Air Pollution:

AQ 1.1.1 Ensure that all land use decisions, including enforcement actions, are made in an equitable fashion to protect residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status or geographic location, from the health effects of air pollution.

AQ 1.1.2 Consider potential environmental justice issues in reviewing impacts (including cumulative impacts for each project proposed), including infill projects, separate and protect sensitive receptors from toxic pollution sources (i.e. perchloroethylene dry cleaners, diesel engines, auto body shops, metal plating facilities, gasoline stations, wood refinishing facilities, warehouses, railyards, freeways, heavily traveled roadways) and other

area, stationary, and indirect sources that emit odors or toxic air contaminants.

AQ 1.1.3 Encourage the development of mapping and inventory resources, including the identification of sensitive receptors, congested traffic corridors, and land uses likely to generate air pollution to facilitate determination of environmental justice issues, and support other land use and public safety efforts at the local level.

AQ 1.1.4 Encourage site plan designs to provide the maximum feasible protection to people and land uses sensitive to air pollution through the use of buffer zones such as barriers and/or distance from emissions sources (see Figure 2-1).

AQ 1.1.5 Encourage the use of pollution control measures, such as landscaping, vegetation and other materials that trap particulate matter or control pollution near sensitive land uses.

AQ 1.1.6 Consider localized air quality impacts when siting sensitive receptors close to emission sources including those that emit odors or toxic air contaminants, and vise versa.

AQ 1.1.7 Consider cumulative air quality impacts when siting new projects to determine if combined impacts from both existing and new projects would place an undue burden on residential areas and other sensitive receptors (see CARB Air Quality and Land Use Handbook for discussion on cumulative impacts).

AQ 1.1.8 Facilitate communication between residents and businesses regarding nuisance issues related to air quality, and advise residents how to register a complaint with AQMD (AQMD's "Cut Smog" program).

AQ 1.1.9 Consider all feasible alternatives to reduce diesel emissions from a project, such as diesel truck traffic, or diesel construction equipment.

AQ 1.1.10 Serve as an advocate for the City's residents regarding location or expansion of facilities or land uses which are not within the City's authority to regulate (e.g. freeways), in order to ensure that the potential health impacts of such projects are thoroughly investigated and mitigated.

Job-Housing Balance

Residents in urban areas in the Basin have become increasingly concerned with increased traffic congestion and the failure of the region to achieve state and federal clean air standards. The concept of a "jobs/housing balance" is based on the premise that the number of vehicle trips and vehicle miles traveled (VMT) can be reduced when sufficient jobs are available locally to balance the employment demands of the community, and when commercial services are convenient to residential areas. Achieving the right balance requires controlling the location and nature of jobs and housing in order to encourage a reduction in vehicle trips and VMT while increasing mass transit ridership and alternative modes of transportation, such as bicycles,

carpools and walking. The AQMD and the SCAG both embrace jobs/housing balance as a viable tool available to local governments to reduce air pollution.

Objective 1.2 Reduce mobile source emissions by reducing vehicle trips and vehicle miles traveled associated with land use patterns.

Suggested Polices Related to Housing and Jobs/Housing Balance:
(Alternatively, these may be included as part of the City's Housing Element)

AQ 1.2.1 Work with the AQMD and developers when siting new facilities to minimize air quality impacts (e.g., avoiding siting facilities with odorous or toxic emissions near sensitive receptors; locating job centers near transit nodes).

AQ 1.2.2 Encourage developers of larger commercial, institutional and industrial offices and high-density residential projects to consider transit-friendly designs for the site perimeter and internal circulation patterns in their submittals to the Planning Department.

AQ 1.2.3 In cases where mixed use development is planned, project proponents shall incorporate appropriate and feasible transit amenities into the plans, after consultation with the local transit agency.

AQ 1.2.4 Promote and support mixed-use, land use patterns that allow the integration of retail, office, institutional and residential uses for the purpose of reducing costs of infrastructure construction and maximizing the use of land. Such land use patterns should avoid placing residential and other sensitive receptors in close proximity to businesses that emit TACs (e.g., perchloroethylene dry cleaners, large gasoline stations, auto body shops, nail salons, restaurants, metal plating facilities, wood refinishing facilities, diesel backup generator sets, warehouses, railyards, etc.).

AQ 1.2.5 Encourage through the land use entitlement process and/or business regulation, design of commercial and residential areas to foster pedestrian circulation.

AQ 1.2.6 Facilitate communication between residents and businesses on nuisance issues related to air quality (e.g., require facilities through the business license, development or conditional use permit processes to notify and communicate with neighbors before they locate or begin operations at a site; require housing and school developers to survey nearby polluting sources before designing the development in order to determine distance thresholds; hold town hall meetings to discuss air quality issues).

AQ 1.2.7 Encourage employment centers, which are non-polluting or extremely low-polluting and do not draw large numbers of vehicles, in proximity to residential uses.

AQ 1.2.8 Promote land use patterns that reduce the number and length of motor vehicle trips and promote alternative modes of travel.

AQ 1.2.9 Review Title 19 – Zoning Ordinance and Title 18 – Subdivision Ordinance when utilizing a Request for Proposals or Request for Qualifications process for a housing development project, encourage as part of the project, or recommend the applicants include as part of their proposed projects, strategies (e.g. use of landscaping, open space, pedestrian routes, design features, operating procedures) for preventing air pollution and reducing impacts on established neighboring residents and residents of the completed project. These strategies should be included as part of the project through inclusion in the development agreement.

AQ 1.2.10 Cooperate with local, regional, state and federal jurisdictions to reduce VMT and motor vehicle emissions through job creation in job-poor areas.

AQ 1.2.11 Establish a Mixed-Use Zoning District that offers incentives to mixed use developments in the District.

AQ 1.2.12 Implement zoning code provisions that encourage community centers, telecommuting and home-based businesses.

AQ 1.2.13 Identify and adopt incentives (e.g., an expedited review process) for planning and implementing infill development projects within urbanized areas that include job centers and transportation nodes (e.g., preparation of "transit village plans," thereby creating opportunities for the receipt of State transportation funds).

AQ 1.2.14 Create "Job/Housing Opportunity Zones," and incentives to support housing in job-rich areas, and jobs in housing-rich areas, while minimizing exposure to TACs.

AQ 1.2.15 Design safe and efficient vehicular access to commercial land uses from arterial streets to ensure efficient vehicular ingress and egress.

AQ 1.2.16 Develop a program that stresses job creation and reduction in vehicle miles traveled in job-poor areas.

AQ 1.2.17 Locate public facilities and services so that they further enhance job creation opportunities.

AQ 1.2.18 Encourage community work centers, telecommuting and home-based businesses.

AQ 1.2.19 Create the maximum possible opportunity for bicycles as an alternative work transportation mode.

AQ 1.2.20 Locate multiple family developments close to commercial areas that do not emit air contaminants and include pedestrian walkways and bicycle paths to reduce mobile source emissions. Avoid locating multiple-family developments in close proximity to commercial/industrial areas that emit TACs.

AQ 1.2.21 Promote planned residential developments and infill housing which reduce

vehicle trips.

AQ 1.2.22 Develop and adhere to a master plan for landscaping, parks, open spaces, trails, and bikeways.

AQ 1.2.23 Develop neighborhood parks and community centers near concentrations of residential areas that encourage self-sufficient "walkable neighborhoods," that include pedestrian walkways and bicycle paths to promote non-motorized travel and discourage automobile dependency.

Objective 1.3 Reduce mobile source emissions by increasing population densities within one-half mile of clean transit nodes.

Suggested Policies to Increase Densities:

AQ 1.3.1 Increase residential and commercial densities around clean rail and bus transit stations and corridors.

AQ 1.3.2 Sponsor "station cars" for short trips to and from transit nodes (e.g., Neighborhood Electric Vehicles).

Objective 1.4 Protect sensitive receptors that are exposed to a significant health risk due to incompatible land use by redesignation of existing land uses.

Suggested Policy to Redesignate Existing Land Uses:

AQ 1.4.1 Where incompatible land use results in emissions of air contaminants that pose significant health risk, redesignate existing land use as necessary to protect public health.

CHAPTER 3
TRANSPORTATION

- **CATEGORIES OF MOBILE SOURCE EMISSIONS**
- **SUGGESTED GOAL, OBJECTIVES AND POLICIES**

TRANSPORTATION

CATEGORIES OF MOBILE SOURCE EMISSIONS

Mobile sources are motorized vehicles, which are classified as either on-road or off-road. On-road mobile sources typically include automobiles and trucks that operate on public roadways. Off-road mobile sources include aircraft, ships, trains, and self-propelled construction equipment that operate off public roadways. Mobile source emissions are accounted for as both direct source emissions (those directly emitted by the individual source) and indirect source emissions, which are sources that by themselves do not emit air contaminants but indirectly cause the generation of air pollutants by attracting vehicles. Examples of indirect sources include office complexes, commercial and government centers, warehouses/distribution centers, sports and recreational complexes, railyards, port terminals, and residential developments that attract mobile source emissions.

SUGGESTED GOAL, OBJECTIVES AND POLICES

Goal 2 **A reduction in air pollution from mobile sources.**

Objective 2.1 **Reduce motor vehicle trips and vehicle miles traveled.**

Suggested Polices to Reduce Motor Vehicle Trips and VMT:

AQ 2.1.1 Seek new cooperative relationships between employers and employees to reduce vehicle miles traveled (VMT).

AQ 2.1.2 Work with large employers and commercial/industrial complexes to create Transportation Management Associations and to implement trip/VMT reduction strategies. For additional information please refer to AQMD's Rule 2202 Employee Commute Reduction Program Guidelines.

AQ 2.1.3 Use incentives, regulations and Transportation Demand Management in cooperation with surrounding jurisdictions to reduce and eliminate vehicle trips and VMT.

AQ 2.1.4 Work with local transit agencies to:

- develop programs and educate employers about employee rideshare and transit.

- establish mass transit mechanisms for the reduction of work-related and non-work related vehicle trips.
- promote mass transit ridership through careful planning of routes, headways, origins and destinations, and types of vehicles.

AQ 2.1.5 Identify and develop non-motorized transportation corridors.

AQ 2.1.6 Assist merchants in encouraging their customers to shift from single occupancy vehicles to transit, carpools, bicycles, or foot (e.g., provide merchants with fliers/posters to publicize public transit).

AQ 2.1.7 Collaborate with the EPA, CARB, AQMD, and warehouse owners to create programs and ordinances to minimize the amount of diesel emissions related to warehousing operations.

AQ 2.1.8 Design traffic plans to minimize diesel truck idling.

AQ 2.1.9 Outline a plan of mobile source enforcement methods such as periodic mobile source (e.g., trucks and buses) checkpoints throughout the City to enforce opacity regulations.

Objective 2.2 Establish necessary policies and requirements for special events and special event operators to minimize mobile source emissions.

Suggested Policies Related to the Reduction of Mobile Source Emissions at Special Event Centers:

AQ 2.2.1 Establish requirements for special event centers to provide off-site parking and park-n-ride facilities at remote locations. Remote parking should be as close as practicable to the event site and the operator should operate or provide alternative-fuel vehicles for shuttles.

AQ 2.2.2 Promote peripheral parking, by increasing on-site parking rates and reduced peripheral parking rates.

AQ 2.2.3 Encourage special event center operators to:

- provide discounted transit passes with event tickets.
- offer discounted on-site parking for carpooling patrons with four or more persons per vehicle.

Transportation System Management

Transportation system management (TSM) is a means of improving the efficiency of the existing transportation system through more effective utilization of facilities. TSM programs that discourage single-occupant vehicle trips and promote flexible work hours may improve levels of service on city streets. Overall, effective TSM programs that reduce the existing traffic congestion and VMT while increasing the carrying capacity of the transportation system will reduce air pollution. The California Department of Transportation lists the following TSM measures that could be appropriately included in the air quality element:

- programs to improve traffic flow
- preferential treatments for transit and other HOV strategies
- provisions for pedestrians and bicyclists
- management/control of parking
- changes in work schedules, fares and tolls
- actions to reduce motor vehicle use in congested areas
- improved public transit

Cities are encouraged to consider all TSM measures in their air quality elements and to collaborate with CATRANS and local transit agencies to reduce air pollution through efficient management of transportation facilities and fleets.

Objective 2.3 **Reduce mobile source emissions through efficient management of transportation facilities and system infrastructure using cost-effective management and innovative demand-management techniques.**

Suggested Policies Related to TSM efficiency:

AQ 2.3.1 Synchronize signals throughout the City and with adjoining cities and counties while allowing free flow of mass transit systems.

AQ 2.3.2 Construct and improve traffic signals with Automated Traffic Surveillance and Control systems at appropriate intersections.

AQ 2.3.3 Reduce traffic delays through highway maintenance, rapid emergency response, debris removal, and elimination of at-grade railroad crossings.

AQ 2.3.4 Encourage businesses to schedule deliveries at off-peak traffic periods through the land use entitlement or business regulation process.

AQ 2.3.5 Encourage the construction of HOV lanes whenever necessary to relieve congestion and reduce air pollution. Emphasize the use of HOV lanes, as well as light rail and bus routes, and pedestrian and bicycle facilities to improve mobility and air quality.

AQ 2.3.6 Monitor traffic and congestion to determine when and where the City needs new transportation facilities to achieve increased mobility efficiency.

AQ 2.3.7 Work with local transit providers to incorporate best design practices for transit into new development projects.

AQ 2.3.8 Adopt a Trip Reduction Ordinance that is equivalent to or more stringent than the requirements of AQMD Rule 2202.

AQ 2.3.9 Implement the required components of the Congestion Management Plan (CMP), and continue to work with (*applicable body/organization*) on annual updates to the CMP.

AQ 2.3.10 Support SCAG's Regional Growth Management Plan by developing intergovernmental agreements with appropriate governmental entities such as the (*Council of Government*), sanitation districts, water districts, and those sub-regional entities identified in the Regional Growth Management Plan.

AQ 2.3.11 Publicize the AQMD's 1-800-CUT-SMOG number for the public to report air pollution complaints to the AQMD.

AQ 2.3.12 Replace existing vehicles in the city fleet with cleanest vehicles commercially available.

Objective 2.4 Secure all available funding from local, state and federal sources to improve TSM cost effectiveness

Suggested Policies Related to Funding Resources:

AQ 2.4.1 Develop and coordinate a plan with local agencies for cost-effective use of AB 2766 funds so that revenue is used for projects and programs identified in the AQMP.

AQ 2.4.2 Develop and adopt a policy to utilize federal Congestion Mitigation and Air Quality Improvement (CMAQ) funds in coordination with regional agencies in a manner consistent with projects approved in the AQMP.

AQ 2.4.3 Apply annually to the AQMD Mobile Source Reduction Committee (MSRC) for AB 2766 "Local Government matching fund" grants for

projects that reduce mobile source emissions (e.g. purchases of alternative-fueled vehicles).

AQ 2.4.4 Seek opportunities to pool AB 2766 revenue with neighboring cities to fund programs that will reduce mobile source emissions (e.g., traffic synchronization, fueling station infrastructure, teleconferencing facilities).

Objective 2.5 Advocate for stricter regulations on mobile source emissions.

Suggested Polices Related to Advocacy:

AQ 2.5.1 Cooperate with state and federal government, in their efforts to reduce exposure from railroad, truck, and ship emissions.

Objective 2.6 Purchase and operate alternative fuel vehicles and encourage the greater use of alternative vehicles

Suggested Policies Related to the Increased Use of Alternative Fuels:

AQ 2.6.1 Support full compliance with the AQMD's Clean Fleet Rules.

AQ 2.6.2 Manage the City's transportation fleet fueling standards to achieve the greatest number of alternative fuel vehicles in the City fleet.

AQ 2.6.3 Encourage City contractors who operate vehicles within the City boundaries to operate alternative fuel vehicles.

AQ 2.6.4 Support the development of alternative fuel infrastructure that is publicly accessible.

AQ 2.6.5 Establish programs for priority or free parking on City streets or in City parking lots for alternative fuel vehicles.

AQ 2.6.6 Join a Clean Cities Coalition or continue affiliation with Clean Cities Coalition.

CHAPTER 4
STATIONARY SOURCES OF AIR POLLUTION

- **CATEGORIES OF STATIONARY EMISSION SOURCES**
- **SUGGESTED GOAL, OBJECTIVES AND POLICIES**

STATIONARY SOURCES OF POLLUTION

CATEGORIES OF STATIONARY EMISSION SOURCES

Air pollutant emissions sources are typically grouped into two categories: stationary and mobile sources. Stationary sources are further divided into two major subcategories point and area sources. Point sources consist of a single emission source with an identified location point at a facility. Facilities could have multiple point sources located onsite. Point sources are usually associated with manufacturing and industrial processes, such as boilers, spray booths or degreasers. Area sources are small emission sources that are widely distributed, but may have substantial cumulative emissions. Examples include residential water heaters, small engines, and consumer products, such as barbecue lighter fluid and hair spray.

In addition to obtaining permits from AQMD and local governments, stationary source facilities that propose new or modified equipment, or want to relocate operations need to obtain or modify permits issued by the AQMD. For modifications at an existing facility, such as expansion of existing operations, it may be helpful for local governments to coordinate with the AQMD to obtain information about the facility's current operations. Further, AQMD will provide information on the type and quantity of pollutants that are currently emitted from the facility and the pollutants that are proposed after the modification. Information on permitted facilities can be obtained from the AQMD's Office of Engineering and Compliance Office.

Cities and counties are encouraged to participate with SCAG and the AQMD in developing and updating stationary source control measures in the AQMP every three years. Further, cities should consider incentives for existing businesses and new developments which reduce emissions identified in 2003 AQMP control measures. The air quality element should include clear policy statement(s) that commits local agencies to promote and support AQMD programs to reduce emissions from stationary sources. To the extent permitted by law, cities are encouraged to incorporate applicable AQMP control measures in the air quality element of their general plans.

SUGGESTED GOAL, OBJECTIVES AND POLICIES

Goal 3 **Reduce air pollution emissions from stationary sources**

Objective 3.1 **Coordinate with the AQMD and operators of stationary source equipment or processes to minimize air pollution emissions**

Suggested Policies Related to Reduction of Emissions from Stationary Sources:

AQ 3.1.1 Assist small businesses by developing training programs related to clean, innovative technologies to reduce air pollution (e.g., wet cleaning or CO_2 cleaning in lieu of perchloroethylene), and provide incentives to those businesses that use clean air technologies.

AQ 3.1.2 Promote the use of building materials and methods that reduce emissions. Require "green building codes" that meet LEED Standards (Leadership in Energy and Environmental Design) that call for conditioning/filtration installation, upgrades, or improvement for all buildings, but particularly for those located near sensitive receptors.

AQ 3.1.3 Support, through the use of development standards, the use of fuel-efficient heating equipment, and other appliances, such as water heaters, swimming pool heaters, cooking equipment, refrigerators, furnaces, boiler units, and low or zero-emitting architectural coatings. Provide incentives to encourage the use of clean air technology beyond what is required by AQMD. For example, encourage the use of fuel and material substitution, cleaner fuel alternatives, product reformulation, change in work practices, and air pollution control measures identified in the latest AQMP.

AQ 3.1.4 Encourage pollution prevention and source reduction strategies through:

- process change;
- best management practices;
- preventative inspection and maintenance program; and
- emergency response planning.

AQ 3.1.5 Provide incentives to promote siting or use of clean air technologies (e.g., fuel cell technologies, renewable energy sources, UV coatings, hydrogen fuel).

AQ 3.1.6 Support legislation which promotes clean industrial technologies, clean stationary source fuels and more efficient burning stationary source combustion equipment.

CHAPTER 5

REDUCTION OF FUGITIVE DUST

- **SUGGESTED GOAL, OBJECTIVES AND POLICIES**

REDUCTION OF FUGITIVE DUST

Fugitive dust is a generic term used to describe a complex group of air pollutants that can vary in size and composition, depending on the location, wind direction, time of the day, and the time of season for its source. These particles can vary from coarse wind blown dust particles to fine particles directly emitted or formed from chemical reactions occurring in the atmosphere. The fugitive dust mixture includes components of nitrates, sulfates, elemental carbon, organic carbon compounds, acid aerosols, trace metals, and geological materials. AQMD's Rule 403 contains a list of measures to reduce fugitive dust. These options can be useful to local planners in drafting dust control policies.

SUGGESTED GOAL, OBJECTIVES AND POLICIES

Goal 4 **Strive to attain and maintain ambient levels of particulate matter that meet state and federal and clean air standards**

Objective 4.1 **Reduce the amount of fugitive dust that is re-entrained into the atmosphere from unpaved areas, parking lots and construction sites**

Suggested Policies Related to Controlling Fugitive Dust Emissions:

AQ 4.1.1 Identify and monitor sources, enforce existing regulations, and promote stronger controls to reduce particulate matter (e.g., require clean fuels for vehicles).

AQ 4.1.2 Adopt a dust control ordinance that requires preparation and approval of a dust control plan for any project requiring a grading permit (model dust control ordinance available from AQMD).

AQ 4.1.3 Adopt by ordinance a regulation that controls the use of leaf blowers in areas with sensitive receptors.

AQ 4.1.4 Encourage vegetative thinning or mowing for weed abatement activities to minimize wind-blown dust.

AQ 4.1.5 Identify and create a control plan for areas within the jurisdiction that are prone to wind erosion of soil and take measures to prevent illegal off-highway vehicle (OHV) use.

AQ 4.1.6 Require conditions in a zoning or conditional use permit to require fugitive dust controls and compliance mechanisms for stationary sources (landfills, composting facilities, aggregate facilities, etc.).

AQ 4.1.7 Ensure compliance with California Vehicle Code section 23113 provisions intended to prevent deposition and rapid removal of material from any highway or street.

AQ 4.1.8 Adopt incentives, regulations, and/or procedures to reduce paved road dust emissions through targeted street sweeping of roads subject to high traffic levels and silt loadings.

AQ 4.1.9 Pave currently unpaved roads and parking lots or establish and enforce 15 mile per hour speed limits on low-use unpaved roads as permitted under California Vehicle code section 22365.

AQ 4.1.10 Adopt incentives or procedures to limit dust from agricultural lands and operations.

AQ 4.1.11 Encourage the suspension of all grading operations when wind speeds (as instantaneous gusts) exceed 25 miles per hour.

AQ 4.1.12 Cooperate with local, regional, state and federal jurisdictions to better control fugitive dust from stationary, mobile and area sources.

AQ 4.1.13 Collaborate with the transportation agencies, utilities, railroads, etc., to minimize fugitive dust during construction and maintenance activities.

AQ 4.1.14 Encourage, and support stricter state and federal legislation for vehicles that spill debris on roadways.

AQ 4.1.15 Require covers when trucks are hauling aggregate or similar materials on public roadways.

AQ 4.1.16 Encourage vegetation or chemical stabilization for disturbed land for multiple construction projects.

CHAPTER 6
ENERGY

- **ENERGY CONSERVATION**
- **PUBLIC FACILITIES AND FLEETS**
- **CALIFORNIA BUILDING STANDARDS**
- **SUGGESTED GOAL, OBJECTIVES AND POLICIES**

ENERGY

ENERGY CONSERVATION

The interrelationship between energy and air quality issues is the basis of this chapter. It is the combustion of fuels such as natural gas that contribute to combustion-related emissions such as NO_x and CO. Gas-fired combustion equipment such as water heaters, pool heaters, space heaters, furnaces, boilers, steam generators, internal combustion engines, etc. are used throughout the Basin in the residential, commercial, and industrial sectors. Residential uses of natural gas include space heating, water heating, laundry, cooking, dishwashers, and pool/hot tub heaters. The largest demand for natural gas from this sector is from space and water heating. Natural gas in the commercial sector is used for space heating, water heating, process heating, cooling, and food preparation. The industrial sector includes a wide range of manufacturing and industrial processes that use natural gas in a variety of processes such as steam generation, curing and drying processes, metal melting, and heat treatment. Implementation policies in this chapter are expected to result in emission reductions from the residential, commercial, and industrial sectors.

PUBLIC FACILITIES AND FLEETS

Energy conservation efficiency and generation operations should be considered when building, acquiring, or retrofitting public facilities. Also, alternative–fuel vehicles are in operation in many local jurisdictions in the district which help reduce mobile source emissions (see Chapter 3-Transportation).

CALIFORNIA BUILDING STANDARDS

Title 24 of the California Code of Regulations incorporates energy efficiency standards into the uniform building code. Local governments have the option to plan for greater energy efficiency in public and private construction that is normally required by Title 24. A more comprehensive approach to energy conservation in building construction is known as “green building.” Green building techniques integrate energy efficiency and sustainable building practices into the design and construction phases. There are several private and government rating systems for green buildings, such as the voluntary LEED (Leadership in Energy and Environmental Design standard developed by the U.S. Green Building Council).

SUGGESTED GOAL, OBJECTIVES AND POLICIES

Goal 5 Reduce air pollution by increasing energy efficiency, conservation, and the use of renewable resources

Objective 5.1 Increase energy efficiency of city facilities and private developments

Suggested Policies Related to Energy Conservation:

AQ 5.1.1 Utilize source reduction, recycling and other appropriate measures, to reduce the amount of solid waste disposed in landfills.

AQ 5.1.2 Develop incentives or ordinances regarding energy conservation requirements for private and public developments.

AQ 5.1.3 Adopt energy-efficient design elements, including appropriate site orientation, use of lighter color roofing and road materials, and use of shade and windbreak trees to reduce fuel consumption for heating and cooling.

AQ 5.1.4 Adopt ordinances that require residential builders to go beyond the requirements of Title 24 of the California Administrative Code.

AQ 5.1.5 Promote the use of automated time clocks or occupant sensors to control central heating and air conditioning.

AQ 5.1.6 Utilize all available renewable energy sources to reduce fuel consumption and demand on the power grid.

AQ 5.1.7 Replace vehicles in the local government fleet with the most fuel-efficient vehicles that are commercially available.

CHAPTER 7
PUBLIC AWARENESS AND EDUCATION

- **SUGGESTED GOAL, OBJECTIVES AND POLICIES**

PUBLIC AWARENESS AND EDUCATION

SUGGESTED GOAL, OBJECTIVES AND POLICIES

Goal 6 **Encourage greater citizen awareness of the changes in personal behavior that can be taken to minimize air pollution**

Objective 6.1 **Make air quality education a priority for the City's effort to protect public health and achieve state and federal clean air standards.**

Suggested Policies Related to Citizen Awareness:

AQ 6.1.1 Provide regional and local air quality information on City's website, including links to the AQMD, CARB, USEPA and other environmental-based internet sites.

AQ 6.1.2 Organize City-sponsored events on topics that improve air quality, (e.g. alternative fuels and low polluting clean household products).

AQ 6.1.3 Work with school districts to develop an air quality curriculum for students.

AQ 6.1.4 Encourage, publicly recognize, and reward innovative approaches that improve air quality.

AQ 6.1.5 Encourage the participation of environmental groups, the business community, civic groups, special interest groups, and the general public in the formulation and implementation of programs that effectively reduce air pollutions.

AQ 6.1.6 Encourage the purchase and use of low- or zero-emission vehicles, coordinate with AQMD and with local car dealerships and their associations to encourage and support the dealerships' participation in AQMD's "Clean Air Choice" vehicle purchase program.

AQ 6.1.7 Provide incentives (e.g., preferential parking) for fuel efficient and clean vehicles (e.g., hybrids).

AQ 6.1.8 Provide public education to encourage local consumers to choose the cleanest paints, consumer products, etc.

REFERENCES

AB 2766 Subvention Fund Program Resource Guide. South Coast Air Quality Management District, January 2004.

Air Quality Management Plan. South Coast Air Quality Management District, August 2003.

CEQA Air Quality Handbook. South Coast Air Quality Management District, April 1993 and updates to the Handbook at www.aqmd.gov/ceqa/index.html.

General Plan Guidelines 2003. Governor's Office of Planning and Research, October 2003.

Guidance for the Development of Indirect Source Control Programs. California Air Resources Board

Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis. South Coast Air Quality Management District, August 2003.

Kim, J., et al Traffic-Related Air Pollution Near Busy Roads – the East Bay Children's Respiratory Health Study, American J. of Respiratory and Critical Care Medicine. 170: 520-526. 2004.

McConnell, K., et al, Traffic and Asthma Prevalence in Children, American J. of Respiratory and Critical Care Medicine. 165 (8): A 492. 2002.

Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATES II). South Coast Air Quality Management District, March 2000.

Ozone Depleting Compound Replacement Guidelines. South Coast Air Quality Management District, Office of Stationary Source Compliance, January 11, 1996.

Policy on Global Warming and Stratospheric Ozone Depletion. South Coast Air Quality Management District, April 6, 1990.

Rule 2202 Employee Commute Reduction Program Guidelines. South Coast Air Quality Management District, February 2004.

Toxic Air Pollutants and Non-cancer Health Risks: Screening Studies. U.S. EPA, Office of Planning Standards, Final External Review Draft, September 1990.

Transportation Project-Level Carbon Monoxide Protocol (CALTRANS CO Protocol). University of California Davis, December 1997.

Wilhelm, M., et al, Residential Proximity to Traffic and Adverse Birth Outcomes in Los Angeles County, California, 1964 -1966. Environmental Health Perspectives. 111:207-216. 2003.

Zhu, Yifang, et al, Study of Ultra-fine Particles Near a Major Highway with Heavy-Duty Diesel Traffic, Atmospheric Environment. 36: 4323. 2002.

GLOSSARY

AB 2766 Funds (AB 2766 (Sher) Motor Vehicle Fee Program): A program that permits air districts and local governments to allocate vehicle registration surcharge fees to projects that reduce motor vehicle emissions such as zero emission vehicles, alternative-fueled street sweepers and trip reduction programs.

Air Pollutants: Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects on humans, animals, vegetation, and/or materials.

Area-wide Sources: Stationary sources of pollution (e.g., water heaters, gas furnaces, fireplaces, and wood stoves) that are typically associated with homes and non-industrial sources. The CCAA requires districts to include area sources in the development and implementation of the AQMPs.

Air Toxics: A generic term referring to a harmful chemical or group of chemicals in the air, that has the potential to produce adverse health effects. Typically, substances that are especially harmful to health, such as those considered under EPA's hazardous air pollutant program or California's AB 1807 toxic air contaminant program, are considered to be air toxics.

Alternate Fuels: Fuels such as methanol, ethanol, natural gas, and liquid propane gases that are cleaner burning and help to meet CARB's mobile and stationary emission standards.

Ambient Air: The air occurring at a particular time and place outside of structures. Often used interchangeably with "outdoor air."

Air Quality Management Plan (AQMP): A Plan prepared by an air pollution control district or air quality management district, for a county or region designated as a non-attainment area, for the purpose of bringing the area into compliance with the requirements of the national and/or California Ambient Air Quality Standards. AQMPs are incorporated into the State Implementation Plan (SIP).

Area Sources: Those sources for which a methodology is used to estimate emissions. This can include area-wide, mobile and natural sources, and also groups of stationary sources (such as dry cleaners and gas stations). The California Clean Air Act requires air districts to include area sources in the development and implementation of the AQMP. In the California emission inventory all sources which are not reported as individual point sources are included as area sources. The federal air toxics program defines a source that emits less than 10 tons per year of a single hazardous air pollutant (HAPS) or 25 tons per year of all HAPs as an area source.

Best Available Control Technology (BACT): The most up-to-date methods, systems, techniques, and production processes available to achieve the greatest feasible emission reductions for given regulated air pollutants and processes. BACT is a requirement of NSR (New Source Review) and PSD (Prevention of Significant Deterioration). BACT, as used in federal law under PSD, is defined as an emission limitation based on the maximum degree of emission reductions allowable taking into account energy, environmental and economic impacts and other costs [CAA Section 169(3)]. The term BACT as used in state law means an emission limitation that will achieve the lowest achievable emission rates, which means the most stringent of either the most stringent emission limits contained in the SIP for the class or category of source, (unless it is demonstrated that one limitation is not achievable) or the most stringent emission limit achieved in practice by that class in category of source. "BACT" under state law is more stringent than federal BACT and is equivalent to federal LAER (lowest achievable emission rate) which applies to NSR permit actions.

Best Available Retrofit Control Technology (BARCT): An air emission limitation that applies to existing sources and is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source.

California Air Resources Board (CARB): The State's lead air quality agency, consisting of a nine-member Governor-appointed board. It is responsible for attainment and maintenance of the State and federal air quality standards, and is fully responsible for motor vehicle pollution control. It oversees county and regional air pollution management programs.

California Ambient Air Quality Standards (CAAQS): Standards set by the State of California for the maximum levels of air pollutants which can exist in the outdoor air without unacceptable effects on human health or the public welfare. These are more stringent than NAAQS.

California Clean Air Act (CCAA): A California law passed in 1988 which provides the basis for air quality planning and regulation independent of federal regulations. A major element of the Act is the requirement that local air pollution control districts and air quality management districts in violation of state ambient air quality standards must prepare attainment plans which identify air quality problems, causes, trends, and actions to be taken to attain and maintain California's air quality standards by the earliest practicable date.

Carbon Monoxide (CO): A colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. Over 80% of the CO emitted in urban areas is contributed by motor vehicles. CO is a criteria air pollutant.

Cleaner-Burning Gasoline: Gasoline fuel that results in reduced emissions of carbon monoxide, nitrogen oxides, reactive organic gases, and particulate matter, in addition to toxic substances such as benzene and 1,3-butadiene.

Congestion Management Plan (CMP): A state mandated program (Government Code Section 65089a), that requires each county to prepare a plan to relieve congestion and reduce air pollution.

Criteria Pollutant: An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and PM_{10} and $PM_{2.5}$. The term "criteria air pollutants" derives from the requirement that the U.S. EPA must describe the characteristics and potential health and welfare effects of these pollutants. The U.S. EPA and CARB periodically review new scientific data and may propose revisions to the standards as a result.

Environmental Protection Agency (EPA): The United States agency charged with setting policy and guidelines, and carrying out legal mandates for the protection of national interests in environmental resources.

Federal Clean Air Act (CAA): A federal law passed in 1970 and amended in 1977 and 1990 which forms the basis for the national air pollution control effort. Basic elements of the act include national ambient air quality standards for major air pollutants, air toxics standards, acid rain control measures, and enforcement provisions.

Fugitive Dust: Dust particles which are introduced into the air through certain activities such as soil cultivation, off-road vehicles, or any vehicles operating on open fields or dirt roadways.

Growth Management Plan: A plan for a given geographical region containing demographic projections (i.e., housing units, employment, and population) through some specified point in time, and which provides recommendations for local governments to better manage growth and reduce projected environmental impacts.

Hybrid Vehicles: Hybrid electric motor vehicles may operate using both electric and gasoline-powered motors. Emissions from hybrid electric motor vehicles can be substantially lower than conventionally powered motor vehicles.

Indirect Source: Any facility, building, structure, or installation, or combination thereof, which generates or attracts mobile source activity that results in emissions of any pollutant (or precursor) for which there is a state ambient air quality standard. Examples include employment sites, shopping centers, sports facilities, housing developments, airports, commercial and industrial development, and parking lots and garages.

Lead: A gray-white metal that is soft, malleable, ductile, and resistant to corrosion. Sources of lead resulting in concentrations in the air include industrial sources and crystal weathering of soils followed by fugitive dust emissions. Health effects from exposure to lead include brain and kidney damage and learning disabilities. Lead is the only substance which is currently listed as both a criteria air pollutant and a toxic air contaminant.

Maximum Achievable Control Technology (MACT): Federal emissions limitations based on the best demonstrated control technology or practices in similar sources to be applied to major sources emitting one or more federal hazardous air pollutants.

Mobile Sources: Sources of air pollution such as automobiles, motorcycles, trucks, off-road vehicles, boats and airplanes (contrast with stationary sources).

National Ambient Air Quality Standards (NAAQS): Standards established by the United States EPA that apply for outdoor air throughout the country. There are two types of NAAQS. Primary standards set limits to protect public health and secondary standards set limits to protect public welfare.

New Source Review (NSR): A program used in development of permits for new or modified industrial facilities which are in a non-attainment area, and which emit non-attainment criteria air pollutants. The two major requirements of NSR are Best Available Control Technology and Emission Offset.

Nitrogen Oxides: Oxides of Nitrogen, NO_x. A general term pertaining to compounds of nitric acid (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant, and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility.

Non Attainment Area: A geographic area identified by the EPA and/or CARB as not meeting either NAAQS or CAAQS standards for a given pollutant.

Opacity Regulations: Rules, laws and regulations that require the measurement of the amount of light obscured by particle pollution in the atmosphere. Opacity is used as an indicator of changes in performance of particulate control systems.

Ozone: A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy. Ozone exists in the upper atmosphere ozone layer as well as at the earth's surface. Ozone at the earth's surface causes numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

Particulate matter (PM): Solid or liquid particles of soot, dust, smoke, fumes, and aerosols.

- **Particulate Matter less than 10 microns (PM_{10}):** A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the air sacs in the lungs where they may be deposited, resulting in adverse health effects. PM_{10} also causes visibility reduction and is a criteria air pollutant.

- **Particulate Matter less than 2.5 microns ($PM_{2.5}$):** A major pollutant consisting of tiny solid or liquid particles, generally soot and aerosols. The size of the particles (2.5 microns or smaller, about 0.0001 inches or less) allows them to easily enter the air sacs deep in the lungs where they may cause adverse health effects, as noted in several recent studies. $PM_{2.5}$ also causes visibility reduction, but is not considered a criteria air pollutant at this time.

Permit: Written authorization from a government agency (e.g., air quality management district) that allows for the construction and/or operation of an emissions generating facility or its equipment within certain specified limits.

State Implementation Plan (SIP): A document prepared by each state describing existing air quality conditions and measures which will be taken to attain and maintain national ambient air quality standards (see AQMP).

Smog Check Program: A motor vehicle inspection program implemented by the Bureau of Automotive Repair. It is designed to identify vehicles in need of maintenance and to assure the effectiveness of their emission control systems on a biennial basis. Enacted in 1979 and strengthened in 1990.

Station Car: A vehicle that operates at a train/rail/transit station for the use of patrons of these transit services. The availability of station cars facilitates and encourages the use of mass transit systems.

Stationary Sources: Non-mobile sources such as power plants, refineries, and manufacturing facilities which emit air pollutants.

South Coast Air Basin (Basin): Includes all of Orange county and the non-desert portions of Los Angeles, Riverside and San Bernardino counties.

Sulfur Dioxide (SO_2): A strong smelling, colorless gas that is formed by the combustion of fossil fuels. Power plants, which may use coal or oil high in sulfur content, can be major sources of SO_2. SO_2 and other sulfur oxides contribute to the problem of acid deposition. SO_2 is a criteria pollutant.

Toxic Air Contaminant (TACs): An air pollutant, identified in regulation by the CARB, which may cause or contribute to an increase in deaths or in serious illness, or which may pose a present or potential hazard to human health. TACs are considered under a different regulatory process (California Health and Safety Code Section 39650 et seq.)

than pollutants subject to CAAQS. Health effects due to TACs may occur at extremely low levels, and it is typically difficult to identify levels of exposure which do not produce adverse health effects.

Transportation System Management (TSM): The use of signal synchronization, while coordinating with and permitting the free flow of mass transit vehicles to achieve mobility.

Visibility: A measurement of the ability to see and identify objects at different distances. Visibility reduction from air pollution is often due to the presence of sulfur and nitrogen oxides, as well as particulate matter.

Zero Emission Vehicles (ZEV): Vehicles which produce no emissions from the on-board source of power (e.g. an electric vehicle).

APPENDIX A

CITIES AND COUNTIES WITHIN THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT THAT HAVE ADOPTED AIR QUALITY ELEMENTS IN GENERAL PLANS

Cities and Counties within the South Coast Air Quality Management District That Have Adopted Air Quality Elements in General Plans

City/County	Date	City/County	Date
Agoura Hills	1994	Laguna Hills	2002
Baldwin Park	2002	Lakewood	1996
Buena Park	1994	Lawndale	1992
Calabasas	1995	Long Beach	1998
Carson	1994	Los Angeles	1992
Cathedral City	2002	Montclair	1999
Cerritos	2002	Palm Desert	1980
Chino	1991	Palm Springs	1993
Colton	1992	Rancho Cucamonga	2001
Commerce	1991	Rancho Mirage	1997
Cudahy	1992	Rancho Palo Verdes	1975
Cypress	2001	Redlands	1995
El Segundo	1992	Riverside County	1995
Fontana	1990	San Bernardino County	1989
Garden Grove	1995	Santa Clarita	1991
Glendale	1994	South Gate	1993
Grand Terrace	1999	Temecula	1993
Hemet	1992	Upland	1991
Huntington Beach	1996	Walnut	1974
Indian Wells	1996	West Hollywood	1988
La Canada-Flintridge	1995	Whittier	1993
La Habra	1992	Yorba Linda	1993
La Quinta	2002	Yucaipa	1992

Source – The California Planners' Book of Lists 2004: Governor's Office of Planning and Research

APPENDIX B

AMBIENT AIR QUALITY STANDARDS

Ambient Air Quality Standards

AIR POLLUTANT	STATE STANDARD CONCENTRATION/ AVERAGING TIME	FEDERAL PRIMARY STANDARD CONCENTRATION/ AVERAGING TIME	MOST RELEVANT EFFECTS
Ozone	0.09 ppm, 1-hr. avg. >	0.12 ppm, 1-hr avg.> 0.08 ppm, 8-hr avg.>	(a) Short-term exposures: (1) Pulmonary function decrements and breathing difficulty. (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. > 20 ppm, 1-hr avg. >	9 ppm, 8-hr avg.> 35 ppm, 1-hr avg.>	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	0.25 ppm, 1-hr avg. >	0.053 ppm, ann. avg.>	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.04 ppm, 24-hr avg.> 0.25 ppm, 1-hr. avg. >	0.03 ppm, ann. avg.> 0.14 ppm, 24-hr avg.>	(a) Broncho constriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM_{10})	20 µg/m3, ann. geometric mean > 50 µg/m3, 24-hr average>	50 µg/m3, ann. arithmetic mean > 150µg/m3, 24-hr avg.>	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Declines in pulmonary function, especially in children; (c) Increased risk of premature death from heart or lung diseases in elderly
Suspended Particulate Matter ($PM_{2.5}$)	12 µg/m3, ann. arithmetic mean	15 µg/m3, ann. arithmetic mean > 65 µg/m3, 24-hr avg.>	
Sulfates	25 µg/m3, 24-hr avg. ≥		(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	1.5 µg/m3, 30-day avg. ≥	1.5 µg/m3, calendar quarter>	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	In sufficient amount such that the extinction coefficient is greater than 0.23 inverse kilometers (to reduce the visual range to less than 10 miles) at relative humidity less than 70 percent, 8-hour average (10am - 6pm)		Visibility impairment on days when relative humidity is less than 70 percent
Hydrogen Sulfide (H_2S)	0.03 ppm, 1-hr. avg. ≥		Odor (rotten egg smell) Headache

Source: South Coast Air Quality Management District

APPENDIX C

HEALTH EFFECTS

OF

AMBIENT AIR POLLUTANTS

Health Effects of Ambient Air Pollutants

Ozone

Ozone is a strong irritant that can constrict the airways, forcing the respiratory system to work hard to provide oxygen. Individuals exercising outdoors, children and people with pre-existing lung disease such as asthma and chronic pulmonary lung disease are considered to be the most susceptible to the health effects of ozone. Short term exposure (lasting for a few hours) to ozone at levels typically observed in Southern California can result in aggravated respiratory diseases such as emphysema, bronchitis and asthma, shortness of breath, increased susceptibility to infections, inflammation of the lung tissue, increased fatigue as well as chest pain, dry throat, headache and nausea.

Elevated ozone levels are associated with increased school absences. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in high ozone communities.

Ozone exposure under exercising conditions is known to increase the severity of the above mentioned observed responses. Animal studies suggest that exposures to a combination of pollutants which include ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish, with repeated exposures biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Particulate Matter

A series of scientific studies has linked particulate matter, especially fine particles, with a variety of significant health problems. A consistent correlation between elevated ambient fine particulate matter (PM_{10} and $PM_{2.5}$) levels and an increase in mortality rates, respiratory infections number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in fine particulate matter concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long-term exposure to particulate

matter. Seniors, people with pre-existing respiratory and/or cardiovascular disease and children appear to be more susceptible to the effects of PM_{10} and $PM_{2.5}$.

Carbon Monoxide (CO)

Carbon monoxide replaces oxygen in the body's red blood cells. Individuals with a deficient blood supply to the heart, patients with diseases involving heart and blood vessels, fetuses (unborn babies), and patients with chronic hypoxemia (oxygen deficiency) as seen in high altitudes are the most susceptible to the adverse effects of CO exposure. People with heart disease are also more susceptible to developing chest pains when exposed to low levels of carbon monoxide. Exposure to high levels of carbon monoxide can slow reflexes and cause drowsiness, and result in death in confined spaces at very high concentrations.

Reduction in birth weight and impaired neurobehavioral development has been observed in animals chronically exposed to CO resulting in carboxyhemoglobin levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels. These include pre-term births and heart abnormalities. Additional research is needed to confirm these results.

Nitrogen Dioxide (NO_2)

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposures to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 healthy individuals. Larger decreases in lung functions are observed in individuals with asthma and/or chronic obstructive pulmonary disease (e.g. chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

In animals, exposure to levels of NO_2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO_2.

Sulfur Dioxide (SO_2)

Exposure of a few minutes to low levels of SO_2 can result in airway constriction in some asthmatics. All asthmatics are sensitive to the effects of SO_2. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2. Animal studies suggest that despite being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Sulfates

Most of the health effects associated with fine particles and sulfur dioxide at ambient levels are also associated with sulfates. Thus, both mortality and morbidity effects have been observed with an increase in ambient sulfate concentrations. However, efforts to separate the effects of sulfates from the effects of other pollutants have generally not been successful. Clinical studies of asthmatics exposed to sulfuric acid suggest that adolescent asthmatics are possibly a subgroup susceptible to acid aerosol exposure. Animal studies suggest that acidic particles such as sulfuric acid aerosol and ammonium bisulfate are more toxic than non-acidic particles like ammonium sulfate. Whether the effects are attributable to acidity or to particles remains unresolved.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures and death. It appears that there are no direct effects of lead on the respiratory system. Lead can be stored in the bone from early-age environmental exposure, and elevated blood leads levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.